Abstract Book

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THE 8th INTERNATIONAL CONFERENCE ON WATER RESOURCES MANAGEMENT AND ENGINEERING

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SECTION 1

Environmental Pollution and Control

WRME010

Air-improvingVolatile Components of Southern Chinaby Forest Medical Effect in Urban Forest of Key Ecological Trees

J. Ma, Y. Wang, B. Zhou, W. Zhao, S. Liu and D. Zhang

ABSTRACT

The forest has the function of reducing pressure, relaxing, healthy and improving the air quality. The study on the medical effect of urban forest has been a focus of study in city forest design and tree species allocation. A variety of volatile compounds with different bio-medical functions can be released from different tree species, resulting in a variety of therapeutic effects. But the difference of forest medical effects of different ecological tree species in South China is not well known, and it is not beneficial to its development. In this paper, 9 species of typicalecological trees (Osmanthusfragrans, Aphananthe aspera, Firmiana simplex, Santalum album, Robiniapseudoacacia, Celtis biondii, Platanusacerifolia, Manglietia fordiana and Celtis tetrandra) were studied. The results indicated that there was a distinct diversity among the volatile constituents in different leaves of the city, which brought about different biological functions and varied median effects of forest. Osmanthus fragrans, Santalum caryophyllus and Aphananthe aspera have more volatile constituents. Most of them have biological activity, so they can be used as ingredients of spices, expensive cosmetics and bio-drugs. However, the volatile constituents in the leaves of Firmiana, Robinia pseudoacacia, Platanus acerifolia, Manglietiafordiana and Celtis tetrandra are relatively low, but they contain a higher proportion of bioactive components, and in particular, the forest health effect obtained from one ingredient of isbetter. The results indicated that the ecological tree species could be widely planted and differentiated in South China, so as to improve the air quality through forest medicine.

Keywords: City Forest, Ecology Tree Species, Medical Effect of Forest, Air improvement, Volatile components.

ICED005

The Urban Design Framework for Sustainable Development: A Transit Oriented Community Design for South Australia

J. Shao, Z. Hu, B. Li, S. Lin

ABSTRACT

Modern urban suburbanization has forced many people to live in places that are much less accessible than their former homes, and require a large amount of motorized transportation. The characteristics of sustainable suburban development, which have been identified as important for Transit Oriented Development (TOD), are defined, such as pedestrian and bicycle paths, population density, job opportunities, urban layout, open and mixed use. The Reedy Creek Town Centre Urban Design Plan aims to guide the development of the surrounding area into an integrated, densely populated city center with a new railway station. In addition, a number of residential and commercial office uses, supported by convenience retailing and related services, providing for a diverse range of people with varying incomes and social interests live and work in suburban area. Based on the work of TOD, this paper sets up a framework of urban design for suburban development to reveal key sustainability strategies. The conclusion is that there is considerable hope in rapidly urbanizing cities with more complex sustainability strategies that provide the basis for appropriate growth, change and development, and to avoid the fragmentation of development.

Keywords: *Urban design, Sustainable development, TOD, Community, Suburbanization.*

WRME052

Establishing the Civil Engineering Implementation Community Quality Life Evaluation Indicators System

Y. Liu, B. Wang, and J. Liu

ABSTRACT

In spite of the study of philosophy, there is little research on the quality of life assessment index system in the implementation community of civil engineering. The aim of this paper is to establish and optimize such a system. In this paper, we choose 32 evaluation indicators and get original data, and select them by means of correlation analysis with PCA, and set up an evaluation index system. By setting up this system, it fills the gap in research.

Keywords: *Civil engineering implementation community, quality life, evaluation indicators system.*

WRME054

Estimate of South China Construction Wastes Based on Quantitative Limit

J. Liu, Y. Liu, S. Zhao, and S. Li

ABSTRACT

Taking the South China region as an example, this paper sets up the list of construction waste according to the bill of quantity, and puts forward the calculation method of the construction waste. Based on existing research data, the scrap rate of major materials is obtained, and the waste output of the newly built engineering is estimated, which is 0.326 m ^{3} per unit area. In this paper, the model more fully estimates the amount of building waste, and promotes classification and reduction of building waste. It recommended that measures to reduce resources be taken, that a classification system be put in place, and that related legislation be improved, and that the waste management system be optimised. At the same time, the model integrates the waste production budget into the tender, which provides a reference for the improvement of the management level of the construction departments.

Keywords: *Construction waste, bill of quantities, waste rate, estimation.*

ICED016

Analysis of Dynamic C-Haracteristics of Liquid Tank Semi-trailer Side S Laying

Z. Zhao, G. Peng, L. Wang, J. Liu , J. Wang

ABSTRACT

To ensure the safe transport of liquid fuel and to prevent liquid sloshing during lateral motion of a semi-trailer truck. Numerical simulation is carried out with T he VOF (Volume of Fluid) multiphase flow model and the standard k-type turbulence model. Thus affecting the driving stability of the tanker. The more the lateral acceleration, the larger the amplitude, and the bigger the impact on the tank, the more the liquid will be. With the increase of the liquid filling rate, the peak value of the impact on the tank is reduced and gradually becomes stable with time. In one cycle, the greater the number of shocks, the faster the rate of lateral force decline will be. The results indicate that the method proposed in this paper is feasible and can be used to improve the lateral stability of the liquid tank.

Keywords: *Driving stability, Lateral movement, Liquid sloshing, Semi-trailer Liquid Tank, liquid filling ratio.*

ICED017

Hydrogen Sulfide Distribution Characteristics and Control Factors in China Province of Xishan Coal Mine of Southern Margin of Junggar Basin

Q. Deng, F. Wu, X. Wu, Y. Wang, M. Liu

ABSTRACT

West Mountain Coal Mine is located in the South Edge of Junggar basin and northern mountain tianshan, there gional structure belongs to the foothill fault-fold structural belt of southern margin of Junggar Basin. Mostthe coal seams formed by the continental facies belong to medium-high sulphur and some are high-sulphur. The concentration of hydrogen sulfide in the coal bed is not uniform, the highest H_2S is 2.11%, the gas composition is $N_2$and CH_4, the composition of H_2S, CO_2, C_2H_6, C_3H_8 etc. The mirror reflectivity of coal is usually in the range of 0.5% ~ 0.7%, and the rich source rocks provide a strong material foundation for forming H2S.The pore structure of coal-bed is a fracture pore, and the middle and better reservoirs are widely distributed. Under the control of hydrodynamic block gas, the dense aquifer formed in the sag basement provides enormous space for generation and migration of groundwater and H_2S.Alongthe flow direction, salinity, pH and H_2SO_4 are gradually increased, the water is highly sulfide-rich, reflecting the fact that an environmentally enclosed well of deep confined water with enough organic matter and reducing environment is susceptible to BSR role, then hydrogen sulphide will form.

Keywords: *Southern margin of Junggar basin, Hydrogen sulfide, Distribution characteristics, Control factors.*

WRME066

Forest Carbon Sequestration Demand Based on Thermal Power and Steel Industry Emission Reduction

F. Long, H. Qi, and G. Wang

ABSTRACT

In China, the heat and steel sectors account for 38% and 16% of the CO2 emissions, which is much higher than the world average, which makes them the focal point for reducing emissions. Based on the estimation of carbon intensity, this paper uses the directional distance function to calculate the marginal abatement costs of CO2 emissions in the above two sectors from 2005 to 2014, and then to estimate the carbon price for each sector. The acceptable price of carbon sequestration is 134-189 CNY/t for thermal power and 519-758 CNY/t for other industries, which is far below the marginal cost of CO2 reduction. For this reason, covered companies can take investments or purchase carbon sequestration of forests in order to achieve targeted emissions reductions.

Keywords: *Marginal abatement cost, carbon intensity, price of forest carbon sequestration, forest carbon sequestration.*

WRME072

Particle Filter Technology for Image Processing Based on

H. Hu

ABSTRACT

Particlefilter, also called conditional probability density transfer, Monte Carlo method, SIS, SIR, ASIR, RPF etc. Object tracking technique based on particle filter has been a hot research topic in the field of image processing. The dynamic model of particle filter is adescription of target's movement mode, if the model description has a big difference to the actual moving mode of the target, it will definitely result in the particle not being able to cover the true location of the target, and the accumulation of tracking errors will also cause the tracking failure. Based on the characteristics of the airborne environment, a two-step dynamic model (TSA) is proposed, which consists of the free model and the servative model, the free model is the process of modeling the target velocity as then on-zero Gaussian Markov, this model can better describe the movement mode of RW model and NCV model by adjusting the parameters, the servative model can estimate the current velocity of the target, replacing the average velocity of the target in the Gaussian markov process. On the basis of the two models, a two-step dynamic model is presented, which can effectively resolve the problems of object tracking.

Keywords: *Particle filter, target tracking, image processing, dynamic model.*

WRME073

The Chinese Economy and Industrial Gravity Centers' Shifting Regulation from 1985 to 2010 GIS-Based Studies

J. Liu, Q. Chang, T. Chen, M. Liu, Y. Qi, and X.Liu

ABSTRACT

If we take the Chinese province (except Taiwan, Hong Kong, and Macao) as the research unit, combining the gravity center model, a study was conducted on the economic and industrial gravity centers transferred to China between 1985 and 2010 using GIS to reveal the economic development, the changing nature of the different sectors and the drivers. In terms of the annual average evariation rate of gravity centre, the tertiary industry has the lowest rate while the secondary industry has the biggest one.

Keywords: *Economy, industry, gravity centre shift, driving force, China.*

WRME034

Total Sediment Transport From One Urban River Basin of the Upper Reaches of the Yellow River

ZJ. Wang, WQ.Ta, J. Zheng, K.Zhang

ABSTRACT

In the case of many events with high sediment yield in arid areas, in which erosion and river erosion are almost as important in sediment transport, it is very important to determine the river sediment dynamics in the basin. For the first time, a distinction is made between the wash load rating curve indicating the change of watershed characteristics and the Ackers and White's bed load function (wash load excluded), so as to identify the real sediment transport pattern in the lower Huangshui River, which is the biggest tributary of the upper Yellow River, which makes a great contribution to the washing load in the Inner Mongolia desert reaches of the Yellow River. On the basis of continuous and detailed hydrologic data from the Minhe gauge station, our findings show that the sediment transport regime has changed in response to the ecological and environmental changes caused by urbanization since the 1980s, with the Suspended Sediment Concentration (SSC) falling by an average of 50% relative to its natural status (1950-1980). The combined use of the wash load rating curve and the theoretical bed load function results in an estimation of the total sediment transport in the lower reaches of the Huangshui River in the 2000s. The transfer ratio between the washing load and the total bed load was 1.45: 1.

Keywords:*Sediment Rating Curve, Wash Load, Load of Bed, Dynamics of Sediment Transport, Huangshui River, Yellow River,*

WRME069

Micro-Vortex Clarification Treatment of Micro-Polluted Source Waters

Z. Tong

ABSTRACT

The integrated micro-swirl clarifier is applied to the intensive conventional treatment of the raw water from the micro-polluted water source and from the water-treatment plants with general water quality issues. It was found that when the influent flow rate of the integrated micro-vortex clarifier was 8 m ³/h, the influent turbidity was 21.7 NTU, and the effluent turbidity of clarification tank was kept under 3 NTU when the amount was 10 mg/L. Removal rates of UV254and CODMn were 25% and 41%. While the operating conditions remained unchanged, the dose was raised to 16 mg/L, and the effluent turbidity of the clarifiers was stable at 0.5 NTU, and the removal efficiency of UV254and CODMn was 40% and 60% respectively. When the dose is increased, the Zeta potential increases and the equivalent diameter of floc increases, and then the effluent turbidity decreases, but the UV254 and CODMn is increased, measured by the Flocculation Control Device (Flocculation Control Device) and the Zeta Potential Meter. This study combines with other clarification techniques. The microvortex cleaning process deserves broad application because of its many advantages, for example, higher coagulation efficiency, shorter reaction time, better quality of treated water, and greater adaptability.

Keywords: *Micro-vortex clarification, vortex reactor, micro-polluted water, water quality.*

WRME076

Reduction and stabilization of soil polluted by hexavalentchromium (Cr6 +)

X. Lu, P. Wang

ABSTRACT

The soil samples contaminated with hexavalentchromium (Cr6 +) were collected in Jingjiang County, China. The Cr6 + contaminated soil is then treated with reduction and stabilization. Six reductants (Fe, SSL, FeSO4, Na2HSO3, Na2S2O3, and Na2S) with various remediation capabilities were tested. The most effective reducing stabiliser was FeSO4, its effectiveness varied with the pH, and the optimal pH was neutral or nearly neutral. Finally, the effects of acidified iron sulphate as reducing agent, cement as curing agent, and combined use of dyeing were tested. The increase in cement content and curingage has significantly improved the curing effect on the soil contaminated with Cr6 +.

Keywords: *Six valence chromium, soil pollution, reducing agent, curing agent.*

ICED056

The Low Carbon Benefits of Industrial Symbiosis from Scope-3: A Case Study in China

H. Li, D. Liang, Y. Xie, Y. Fang

ABSTRACT

Reducing Greenhouse Gases (GHGs) emissions is a key issue in maintaining sustainable development, in particular in rapidly industrialising China. Industrial symbiosis is a systemic innovation to combat climate change, and the scope of GHGs inventory provides a new perspective for low-carbon policy-making. Against this background, the study calculates the scope 3 of CO2 emissions and its mitigation in support of invasive alien species in China. On the basis of an on-site investigation, a case study was carried out in a typical industrial city in China. The results show that, if all the proposed scenarios for industrial symbiosis and renewable energy use are implemented, scope 3 emissions would be reduced by 1350295,66 t CO2, of which emissions from upstream material and downstream waste management would fall by 899776.04 and 452928.30 t CO2. Transport emissions would rise by 2408.68 tCO2 per year. Although industrial symbiosis is effective in reducing Horizon 3 emissions, it is essential to improve transport efficiency in order to improve it. Finally, it is suggested and discussed that the political consequences of continuously improving the support of aquaculture symbiosis and future research interests.

Keywords: *Industrial symbiosis, Renewable energy, GHGs inventory, Scope 3, China*

ICED063

Design of Hub and Spoke Container Shipping Network Based on CO2 Emissions

B. Lu

ABSTRACT

The International Maritime Organization (IMO) has started to impose CO2 tax on shipping companies, which has brought a new challenge to the decision-making system of container shipping. In this paper, a new method of collaborative optimization and decision making is presented for the design of the hub and spoke container transport network. The method is based on the nonlinear optimization model, which is constrained by the flow balance and the capacity of the hub port, and Lagrangian relaxation. On the basis of numerical tests, taking into account CO2 emissions, the utilization of the two hub ports is 0.9932 and 0.9732, otherwise 0.6872 and 0.5106, respectively. So, it is proved that the model and algorithm presented in this paper are efficient, reliable and applicable for the design of container transportation network. Moreover, it can be concluded that, CO2 emissions are negatively related to the utilization ratio of hub ports, and the capacity constraints of hub ports also influence the decision-making process.

Keywords: *Multi-cost Collaborative, Decision making models, Lagrangian Relaxation, Hub-and-spoke Network*

ICED028

A Study on Sustainable Hotel Design

Y. Chen, P. Tsui, and C. Lee

ABSTRACT

This paper considers sustainability from the perspective of tourism and hospitality practices. The important role of buildings and hotels in reducing the negative impact on the environment through the implementation of sustainability is emphasized. The purpose of this study is to provide a FAHP evaluation model for hoteliers when designing green hotel interiors. Prior to the FAHP, the Delphi method was used to create the hierarchy. the criteria priorities calculated by the FAHP can be directly interpreted as priorities when designing. Sustainable hotels that are designed, built and operated sustainably use energy, water, materials and land more efficiently and effectively than hotels that are simply built to code. The results of this study will help hoteliers make decisions with limited budgets and resources. At the same time, we hope to call more attention to green hotel efforts.

Keywords: *FAHP evaluation model, sustainable hotels, green hotel.*

ICED036

The Environmental impact of mine Solid Waste on Soil and its Formation Mechanism

S. Fan

ABSTRACT

The objective was to study the contamination of soil by mine solid waste. By measuring the total amount of heavy metals and toxic leaching tests on the solid waste and soil samples of Luerba gold mine, the leaching and migration characteristics of heavy metals in soil were studied, and the mechanism of pollution formation was discussed. Finally, the heavy metal contamination status of Luerba gold mine was evaluated by using the ground accumulation index and the Nemero pollution index. The results showed that the solid waste of Luerba gold mine is a hazardous waste with leaching toxicity and is the main source of heavy metal pollution in the area. The soil in the mine area was found to be contaminated with heavy metals to different degrees, and the heavy metal content was significantly higher than the background value. The main elements causing contamination were arsenic and antimony, with significant concentrations of mercury and small amounts of lead, copper, zinc and manganese. In particular, the most severe heavy metal contamination was detected in the soil downstream of the tailings. The sample contained 3725 mg/kg of arsenic, 187 times the reference value and 124 times the national standard for Class III, and 427.5 mg/kg of antimony, 38.5 times the reference value. In addition, the heavy metals were transferred downward to a depth of 60 cm underground, causing serious pollution and even threatening the safety of local groundwater.

Keywords: *soil pollution, solid waste, heavy metal, formation mechanism.*

ICED041

Changes of inorganic nitrogen content in soil solution of rice straw returned to the field in Northeast China

C. Yan, S. Yan, S. Dong, C. Ma, Z. Gong, Z. Zhang

ABSTRACT

To study the effects of straw return and nitrogen fertilization on nitrogen concentration and yield in soil solution during rice fertility. The changes of nitrogen concentration in soil solution were studied by continuous positioning plot test, pot test and indoor incubation test. The results showed that the contents of ammonium nitrogen, nitrate nitrogen and mineral nitrogen in the soil solution gradually decreased with the growth of rice. In addition, the N content in the soil solution gradually increased with increasing N fertilizer application, however, increasing N fertilizer application did not change the effect of SRT on the N content in the soil solution. n increased by 29.08% (0.17 mg-L-1) in the soil solution during the rice growing period compared with SRM, in contrast, the nitrate-n and mineral N contents decreased by 8.90% (0.47 mg-L-1) and 3.02% (0.29 mg-L-1), respectively. In the northeastern black soil region, straw return reduced the concentration of nitrate N in soil solution and the mineral N content was lower than straw return. Under production conditions, straw return had a tendency to increase rice yield.

Keywords: *Rice, straw return, soil solution, inorganic nitrogen.*

SECTION 2

Hydrologic Numerical Simulation and Numerical Models

ICED001

Over-Mature Organic Rich Gas Shale Material Balance Equation

Y. Yu, Y. Ping, Q. Chengwei, W. Xiang, P. Xiaodong

ABSTRACT

Gas shale has been treated as a five - porosity system. As the source rock matures, some of the kerogen or bitumenwill be converted to hydrocarbon, and move to displace the water out of formation. When the kerogen or bitumen is recrystallized to graphite, there will be less dissolved gas left in solid kerogen, which was believed to be substantial in some immature source rock. A series of resistivity tests show the resistivity of shale does decreases with the higher Ro value, and prove that graphite exists in over-mature shale. Based on the analysis of the role of natural fracture inshale, the reservoir water and hydrocarbon in over-mature shaleas are summarized, and a general model is proposed for either organic-rich shale with thin layer or pure organic shale. To find out which pore can accommodate most of the free gas, a generalized material balance equation is developed, and the volume change with pressure drop in organic matrix and inorganic matrix can be calculated simultaneously. The results show that the new material balance equation can be used to calculate the original free gas and the adsorbed gas in the shale or sandstone, and that the free gas is mostly located in the organic pores.

Keywords: *Shale Gas, Over-mature Kerogen, Material Balance Equation.*

WRME007

Piv and Nactual Studies of Artificial Upwelling via Differential Heating in Open Surroundings

M. Lv, Y. Mao, M. Xia, H. Liu, X. Nie, X. Tian, H. Pan and Z. Zhu

ABSTRACT

Artificial upwelling is regarded as one of the most promising techniques for the restoration of the marine environment, especially for the restoration of the marine environment. In this paper, the basic features of "Differential-Heating- Liquid- Upwelling" (DHLU) are studied with PIV and numerical analysis. A PIV system was used to measure the flow field of upwellingunder typical conditions. On the basis of experimental data, a reasonable model was established to investigate the key properties of the DHLU. The results indicate that the upwelling in the DHLU system is dominated by the high-ascending velocity mass. It is reasonable to use k-ε turbulence model to study the DHLU flow field. The three important parameters, such as characteristic ascending speed, cross sectional area of upwelling flow, and upwelling's flow rate, all increase first and then decrease when the height from the heating source is increased. However, the highest value of the characteristic ascent velocity is far below the other two parameters. The flow rate of 95.9 cm3/s has been achieved in the studiedcases.

Key words: artificially rising, differential heating, numerical simulation, PIV.

ICED014

Simulation Analysis of Effect of Wall Temperature on Air Temperature in Mine

Y. Zhang, S. Lu, X. Zhang, T. Fang

ABSTRACT

As the depth of mining increases, it becomes more and more likely that the deep geothermal will affect the air temperature, on the basis of the technical background of the typical deep mine, the wet and hot transfer process of the surrounding rock and air is analyzed, the road model is built in the Gambit environment, then the air terminal temperature index coefficient is calculated, the numerical simulation is carried out with the FLUENT calculation, the wall temperature is analysed to influence the end temperature of the air, the results of the analysis indicate that, under the condition of the guarantee other parameters, the average temperature of the air is constant, the average temperature of the air is increased with the increase of the tunnel wall temperature, the fitting equation is linear. Simulation results indicate that, only considering wall temperature, wall temperature and outlet air flowa average temperature have a positive correlation and Linear increase.

Keywords: Air temperature, Geothermal, Mine, Numerical simulation.

WRME055

Water and Heat Transfer Between Wall Rock in High Temperature Mine and Its Application

R. Wang, Y. Zhang, F Yuan, and S. Zhou

ABSTRACT

Along with the deepening of mining depth, the underground temperature and humidity will become more and more serious, so it is necessary to take positive and effective measures to ensure the safety and efficiency of mining. In order to show that the influence of wall rock on the airflow and temperature, and predict the temperature and humidity of the airflow in the roadway accurately. This article is based on the heat transfer theory, analyses the exothermic mechanism of wall rock in various conditions, builds up the water and heat transfer model of wall rock and air flow. In fact, it measured the temperature of the underground air flow in a typical metal mine, and compared the measured and predicted results. Result showed that predicting results are in good agreement of the measuring results. They can also be used as a reference for management of underground heat and humidity damage.

Keywords: *Wall rock, moisture and heat transfer, simulation, conduct heat.*

WRME063

Effective Light Propagation of Chlorella ZY-1 Cuture in Plate Equation Photobioreactor

L. Yue, Y. Zhang, and Q. Yang

ABSTRACT

In order to analyse the influence of efficient light propagation on the growth of photobiological photobioreactor, automatic optimizing of the bioreactor and obtaining a high CO2 fixation rate, the effective light distribution in the bioreactor was studied when Chlorella ZY-1 was cultured in a plate equation photobioreactor, the mathematical model of the propagation of effective light in the single-and two-sided photobioreactor was established, and the calculation values were compared with the practical values obtained from the experiments. The results were showed. The mathematical model for the distribution of effective light in this paper is reasonable and in accordance with the experimental results. Theoretical proof for improving the structure of photobioreactor has been provided.

Keywords: *Photo-bioreactor, the effective light propagation, model, structural improvement.*

WRME067

Estimation of Vegetation Cover Variation in Upper Reaches of Minjiang River with Remote Sensing

B. Deng, W. Yang, J. Huang, and N. Mu

ABSTRACT

In this paper, the Minjiang River, which is one of the main water sources of ChengduPlain and Yangtze River, was chosen as the research area. Through a series of Landsat TM/OLI, which were taken on 24 June 1994 and June 1 2014, the vegetation cover of the research area was calculated by using the Vegetation Index and the Discrete Pixel Model. In this paper, the temporal and spatial variation of vegetation cover was analyzed by using the digital altitude model and the county area. The average vegetation coverage was reduced from 68.97% in 1994 to 60.39% in 2014. The results indicated that there was a close relationship between the change of vegetation and topography. The percentage of the degraded area increased with elevation, and the degradation of vegetation was the most severe at the elevation range of 3500 to 4500 m. In Wenchuan Countyand Songpan County, the vegetation was degraded most obviously. The geological disasters caused by earthquake and human disturbance are the main reasons for the deterioration of vegetation, and the drought tendency is the other important one.

Keywords: *Vegetation coverage change, vegetation index, dimidiate pixel model, the upstream of Minjiang River, China.*

WRME070

Influence of Model Conceptualization of Unsaturated Flow on Dynamic Response of Integrated Distributed Hydrology Model

X. Lu, K H. Jensen, M. Jin, and P. Wang

ABSTRACT

The water dynamics in the unsaturated zone is one of the most important processes as it controls model accuracy. One of the limitations of using a catchment model based on a Richards equation is the large number of parameters needed to run the model. In this paper, we study the influence of the non-saturated flow model on the dynamic response of the integrated distributed hydrological model, namely (1) Richards equation (simple parametric RI2) (2) Two-Layer Water Equilibrium Model (TLM). MIKESHE is used in the Skjern river basin to test and analyse the impact of various non-saturated flow models on the dynamic response of an integrated distributed hydrological model. The results of this study show that the TLM, RI2 sequence for the maximum discharge at the outlet of the river basin is observed. Similar results have been obtained for the discharge characteristics of the sub-basin. It is shown that the TLM model is better suited to the Skjern river basin than the complex Raoult equation model, whereas its shortcomings do not describe the groundwater dynamics well.

Keywords: *Unsaturated flow model, lag effect, groundwater and surface water coupling, hydrodynamic response, mikeshe.*

WRME071

Finding the Shortest Path by Recursive Programming in Transport

Y. Xiao, W. Zhang

ABSTRACT

Along with the development of transportation business in China, people pay more and more attention to the problem of how to reduce the transport cost. Along with the development of science and technology, dynamic programming has been widely used in many fields, including economics, engineering, transport and industry. In which, one of the most important methods of dynamic programming is to solve the shortest path problem in the transport sector. In this paper, a dynamic programming method is proposed for solving the shortest path between transport processes, which consists of several sub-stages. The algorithm selects the optimal strategy at various stages, and ultimately finds the optimal overall objective of the entire transport process which is the shortest path routing. The basic idea of dynamic programming is put forward, and the general mathematical model of dynamic programming is established. The procedure of solving the shortest path is analyzed. The paper illustrated the use of dynamic programming method for solving the shortest path on the transportation process, with a very simple and quick nature.

Keywords: *Transportation, dynamic programming, shortest path.*

ICED051

Top Coal Thickness Wavelet Transform-based Elastic Wave Detection Signal

Y. Ma

ABSTRACT

The accurate calculation of the top coal thickness in the process and analysis of the detecting signal is very difficult. In order to solve this problem, a new method based on wavelet transform is presented. In this paper, the characteristics of detecting the thickness of top coal and the principle of measuring the thickness of coal with elastic wave are discussed in detail. According to the feature and principle of detecting coal thickness, the detecting signal of coal thickness based on wavelet transform is obtained. The features of wavelet base are researched and chosen. Then, the maximum module processing of the detecting signal and the wavelet transform are analyzed, and the detection of the top coal thickness is accomplished. It is proved by experiments that the calculation results of the top coal thickness obtained by wavelet transform are in good agreement with the practical ones, and the top coal thickness can be calculated exactly. The outcome was very satisfying.

Keywords: *wavelet transform, elastic wave detection method, top coal thickness, modulus maximum.*

WRME038

Water Conservancy Construction Supervision Unit Based on the Variable Weight Fuzzy Theory Management Level Evaluation

B.Wang, TY.Fan, MQ.Liu, FQ.Wang, XT. Nie

ABSTRACT

In this paper, the evaluation index system of water conservancy construction supervision units is set up. In order to solve the problem that Analytic Hierarchy Process (AHP) can't provide more rational weights, this paper introduces the idea of variable weight. The variable weight method is used to determine the constant weight vector of the evaluation index according to AHP. Based on the variable weight fuzzy theory, this paper studies the management level assessment of water conservancy construction supervision units. Finally, the rationality and validity of this method are verified by an example.

Keywords: *Evaluation index, Variable weight, Fuzzy theory, Management level.*

ICED060

Groundwater Hydrochemical Characteristics in Victory Canal Irrigation District

Z. Liu, W. Yuan, F. Wang, Y. Han

ABSTRACT

The natural circulation system of ground water is changed by climate change and high intensity human activity. The identification and tracing of the variation information is an important method for the research of the regional water cycle. The People's Victory Canal Irrigation District was chosen as the research area to study the spatial distribution law of groundwater chemistry. Using statistical method, ion ratio coefficient and so on, the effect mechanism of regional ground water is revealed. The results show that: TDS and Na +, Ca 2 + and so on in the wet season are lower than in the dry season, but the concentration of H03 in wet season is higher than in dry season. The spatial distribution of TDS and the major chemical ions in the groundwater flow direction is increasing gradually. The hydrochemistry type changes from low mineralizing groundwater to high mineralizing groundwater. Abnormal TDS and ions in G-08 and G-06 were due to human contamination.

Keywords: *The People's Victory Irrigation District, Hydrochemical Characteristics, Groundwater chemical composition, Evolution Rule*

ICED065

Big Data Technology in Water Management Standard Establishment and Revision

Y. Bai, X. Bai, L. Lin, J. Huang

ABSTRACT

On the basis of AI and big data analysis, Big Data technology is a basic process which includes composing, consulting, issuing, executing and supervising. The application is referred to as "standards of intelligent water management". "Smart Water Management Standards" not only encourages businesses to become more involved, but also encourages technological innovation in water management and the modernisation of water use, so that the public can ultimately benefit from these standards. According to the whole lifecycle process of standard development, the integrated solution of WMS is built in three aspects: basic data resource platform, uniform data platform and data resource utilization. The feasibility and value of intelligent water management standard are analyzed in this paper.

Keywords: *water management, standard, big data*

ICED035

Marginal Benefit of Water use and its Temporal and Spatial Differences in Henan Province

S. Lü. H. Yang, F. Wang, and H. Zhong

ABSTRACT

Water is one of the indispensable resources for production and life. Agriculture, industry and domestic are the direct water uses considered. In this paper, the concept of marginal production value is used to estimate the marginal benefits of water use in Henan Province. The Cobb-Douglas production function is considered using agricultural, industrial and domestic water use data for 18 cities in Henan Province from 2006 to 2013. The results show that both industrial and domestic water use increased during the study period, except for the marginal benefits of agriculture in highly developed areas, and the benefits of industrial and domestic water use were much higher than those of agriculture. At the same time, the benefits were higher in developed areas than in developing areas. The benefits of agricultural and industrial water use in the highly developed areas gradually increased, while the benefits of agricultural and industrial water use in the less developed areas did not change much, however, the benefits of domestic water use showed the opposite trend. For the time being, there is still room for marginal benefits of water use to rise. These results are needed to determine how scarce water resources should be allocated to different regions and sectors.

Keywords: Marginal benefit, Cobb-Douglas production function, temporal-spatial difference, Henan province

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ICED069

Application of Data Envelopment Analysis to Optimize Agricultural Input Efficiency of Chinese Wheat Production

N. Wang, X. Jin, Y. Gao, X. Li

ABSTRACT

The environmental pollution and food security caused by the surplus of agricultural inputs have attracted the world's attention recently. Increasing the efficiency of the use of agricultural inputs is an important means of alleviating the above-mentioned problems. To this end, 54 small wheat farmers in Shandong Province were investigated from December 2014 to February 2015. The data were used in the evaluation of the utilization efficiency and the cost of agricultural input in wheat production by the Data Envelopment Analysis. The average technical, technical and scale efficiency of the farmers were 0.69, 0.769, 0.884, and 83.7% of them were working on a declining scale. The high efficiency farmers of Weifang City can be used as a reference for others. While the overall target input cost could be reduced by 16,6% for primary input, fertilisers, seeds and irrigation contributed significantly to the overall cost savings. The productivity of the target was 16.35 kg $-1, an increase of 19.6 per cent if the advice was adopted by the farmers in the study. Finally, some suggestions are made for the future government policies and the improvement of the farmers'production.

Keywords: *Environment pollution, Data Envelopment Analysis,agricultural inputs, technical efficiency, wheat production*

WRME093

Numerical simulation of nutrients ecological dynamics in Weifang sea area

H.Y. Shi, X.R. Zhang

ABSTRACT

In recent years, with the development of coastal industry and agriculture and population growth, the nutrient salts carried by rivers entering the sea have been increasing, and the hydrodynamics of the sea have been weakened, resulting in serious damage to the marine ecological environment.In this paper, we investigate the nutrient distribution characteristics of Weifang sea area by using a combination of actual measurements and numerical models, establish an ecodynamic model to analyze the seawater semi-exchange time and study the nutrient contribution of rivers entering the sea in Weifang area.The calculation results show that the semi-exchange time of Weifang sea area is extended by 20 days from 1990 to 2022, and the contribution of Xiaoqing River and Mi River to Weifang sea area is higher.

Keywords: *MIKE 3 FM, Nutritional Salt, Half exchange time,Contribution rate.*

SECTION 3

Disasters and Control

ICED009

Experimental Study on the Evolutionary Features of CO_2 Phase-transition Blasting in Gas-Rich Coal Seam

Z. Wei, X. Kai-li, L. Yun, Z. Bai-lin

ABSTRACT

In order to study the evolution characteristics of damage and destruction to gas-rich coal seams caused by CO_2 phase transition blasting, a mathematical model for blasting is established. Based on the mathematical model of blasting and the geologic and physical parameters of the coal seam, a discrete element numerical model is established, which is simulated by PFC^{2D}. The simulation finally works out that the radius of the destruction zone of coal mass near coal seam bore resulting from blasting disturbance is 2m while the destruction zone is 2m-3m in size. Based on the principle of tracer gas in this paper, a new method for measuring the damage and destruction zone of coal body is put forward. Field experimental analysis shows that the theoretical calculation, the numerical simulation and the experimental results are consistent.

Keywords: *Gas-rich, CO_2 phase transition, Theory of blasting, PFC^{2D}, Damage and destruction, Tracer gas.*

ICED012

The Control Effect of Coal and Gas Outburst by Tectonic Stress Field

W. Gong, D. Guo

ABSTRACT

In this paper, the author takes Pingdingshan East Mining Area as a study area, and analyses the evolution rule of regional tectonic stress and the distribution characteristics of modern tectonic stress. The influence of structural stress field on geologic structure redistribution, gas generation and structural coal exploitation is discussed, and the influence of tectonic stress field on coal outburst is also discussed. The results show that: the tectonic stress field has formed the geological structure pattern of Pingdingshan East Mining Area, which has caused the difference in the distribution of the Gas Generating Indifferent Area, which leads to the large-scale structural coal exploitation. Modern structural stress field makes the crushing and mylonitization of structural coal more severe, and affects the gas pressure, permeability and permeability. Modern tectonic stress is the main driving force for the outburst of coal and gas, which makes it more likely and more likely to burst.

Keywords: *Tectonic stress field, Coal and gas outburst, Tectonic coal, Fault, Anticline, Syncline.*

WRME057

Regional Total-Factor Energy Efficiency Considering Natural Disaster Effects

C. Liu, L. Zhang

ABSTRACT

This paper analyses the total factor energy efficiency (TFEE) for 30 regions in China from 2004 to 2010. Based on DEA (DEA), this paper calculates TFP for 30 regions in China and three major regions in China, Eastern, Middle and Western regions. In addition, the paper further studies the total factor energy efficiency by using Malmqsitindex, and puts forward some suggestions for improving it. The empirical results show that the overall efficiency of the Chinese economy is declining, while that of other regions varies over time, and the total factor energy efficiency of the three major areas is also different, but there is a trend of convergence. The study also come to the conclusion that technical change is an double-edged sword, it makes little contribution to TFP considering natural disasters compared to ignoring the impacts. Therefore, the government must make rational use of technology to mitigate its adverse effects by increasing investment in technological science and promoting technological innovation, thereby making China's energy efficiency more efficient.

Keywords: *Total-factor energy efficiency, natural disaster, panel data, mamlqusit index.*

ICED024

Petroleum Security Evaluation in China Based on DHGF and Entropy Technology Model

H. Liu, Z. Zhang, Z. Li, H. Yan

ABSTRACT

Based on the actual situation in China, this paper sets up an evaluation index system of oil security in China under the background of international oil price fluctuation. Based on DHGF and entropy, this paper evaluates the safety status of Chinese spetroleum during 1995-2016. The result of evaluation shows that petroleum security was in a "relative dangerous" state from 2000 to 2013and returned to "general" from 2014 to 2016. The evaluation of oil safety situation in China with DHGF and entropy is a new attempt in evaluating oil safety.

Keywords: *Petroleum security evaluation, Dhgf and entropy technology model, China.*

WRME068

Study on Urban Green Space Vertical Design Based on Rainwater Utilization Case Study of Lishui City

W. Wu, Y. Ren, S. Zhang, C. Huang, and Y. Huang

ABSTRACT

Along with the increasing rate of urbanization in the modern society, the shortage of water resources and severe pollution has become more and more serious. In this situation, the collection and utilization of rain water, which is one of the key water resources resources, has attracted more and more attention. The collection and utilization of rainwater resources is one of the simplest and most efficient methods to save water in the construction of urban green space. On the basis of exploring the strategy of using rain water in the city green land and the main carrier and form of rain water use, the paper introduces an example of Lishui city's landscape design. Combining theory with practice, this paper discusses the verticaldesign of urban green space, which is based on the use of rain water, by combining the method of collecting rainwater and the vertical design of landscape. It was intended to provide reference for the relevant design and search.

Keywords: *Vertical design, rainwater utilization, strategy, carrier, urban green space, Lishui City.*

WRME035

Risk Evaluation of Project Basedon Grey Fuzzy Theory for Water Conservancy Ppp

B. Wang, N.Shi, FQ.Wang, XT.Nie

ABSTRACT

This paper puts forward a quantitative method to evaluate the risk of PPP project. First of all, based on the features of PPP project, this paper establishes the risk assessment index system of PPP project by Delphi method and document collection method. Secondly, Rank Correlation Analysis is used to determine the risk evaluation index of PPP project. At last, the gray fuzzy synthetic evaluation model was used in the PPP project of Fendou Reservoir.

Keywords:*Gray Fuzzy Theory, PPP Project, Risk Assessment, Rank Correlation Analysis, Water Conservancy Project*

WRME041

Rainfall Threshold Calculation With Two-Layer Progressive Model for Sensitivity Analysis of Flash Flood Parameters

WL.Yuan, QY.Gao, F.Wan, , XL.Zhang, FQ.Wang

ABSTRACT

As one of the most dangerous natural phenomena, flash floods often cause death and serious damage to infrastructure and public health. Rainfall Threshold (RT) is one of the most important warning indicators in China. But in the RT computation, the number of parameters is very big, and the determination of some parameters is largely affected by the subjective factors. A Morris-Sobol Two-layer Progressive Model (M-STPM) is proposed to recognize sensitive parameters in RT. First of all, the sensitivity analysis is carried out by using Morris screening method, and the insensitive parameters are filtered. Then the Sobol method is used to quantify the sensitivity. Finally, the sensitivity of the parameters in the RT computation is determined by the case of Duli Village, Anyang County, Henan Province. The results show that the average of 1-h maximum point precipitation is the most important parameter. The results show that the model can be used as a reference for the determination of the parameters, and it can be used to analyze the error of RT.

Keywords: *Flash Flood, Rainfall Threshold, Sensitivity of Parameters, Morris-Sobol Two-layer Progressive Model, Water Level-Discharge Inversion Method*

ICED064

Applicability Evaluation on the Climatic Drought Indicators of Henan Province

F. Q.Wang, Z. Zheng, P. P. Kang, L.Wang

ABSTRACT

Based on the data collected from 18 stations in Henan Province between 1953 and 2012, Pa, Z, M are selected as three typical drought indicators to analyze the evolution of drought from drought change and drought index, and to evaluate their applicability. The results indicate that the high frequency seasonal variation is the feature of the drought region of Henan Province. At the same time, the intensity and duration of the drought show evidence of inter-annual variations, and the overall increase is slow. The evaluation results indicate that the Pa (M) Index is less (higher) than the real one, but the Z Index can offer a more realistic result. Ph. index is much more dependent on the average, and has a slow response to the drought and can't indicate extremely dry conditions.M index is more sensitive to the drought but can sometimes exaggerate the actual situation. The Z Index takes into account not only the fact that precipitation varies with the Partial Distribution (PD), but also the normalization method to prevent errors at various spatial and temporal scales. So the outcome is more in line with the situation. The results can be used as references for the evaluation of drought in Henan Province.

Keywords: *China, drought index, precipitation, applicability evaluation, China-Z Index*

ICED038

A Fuzzy Integrated Evaluation of Ecological Management of Urban Flooding

J. Bai, J. Wang, Y. Zhang, X. Ji, N. Wen, and H. Li

ABSTRACT

In recent years, urban flooding has occurred in many cities, leading to deterioration of the habitat and constraining urban economic development. Urban flooding is mainly caused by the serious damage of urban ecological environment. The integrated technology system of urban flooding ecological management consists of cast-in-place grid technology, permeable grass ground technology and ecological wall greening technology. This system can rebuild the urban ecological environment, restore the city's ability to absorb rainwater by itself, and realize the ecological control of urban flooding. Based on the introduction of this technology system, this study experimentally measured the indicators of the above three technologies, including plant survival rate and cover, greening rate, intensity, and surface runoff formed by rainfall after 6 months of planting. The results show that the system can reduce surface runoff when the rainfall duration is 24 h and the rain intensity is 60 mm/24 h, 70 mm/24 h and 80 mm/24 h, respectively. The evaluation results were significant using hierarchical analysis-fuzzy integrated evaluation method with 4 levels, i.e., significant, significant, fair and poor. This result is consistent with the experimental results. This paper proposes a new method to solve urban flooding.

Keywords: *Urban flooding, ecological control, AHP, fuzzy comprehensive evaluation.*

ICED046

Forest Fire Spread Model Based on Grey System Theory with Modis Data

J. Wang, Z. Feng, L. Zhang, C. Lv, H. Gao

ABSTRACT

Forest fires are characterized by suddenness and randomness, posing a great threat to humans and the environment in a short period of time. The key technology for fighting forest fires is to build a forest fire spread model to predict the spread of forest fires. Currently, most models require many coefficients, which need to be determined experimentally, thus increasing the difficulty of modeling. To address the above problems, this paper introduces gray system theory into the forest fire spread model. By pre-processing and fusing MODIS remote sensing data and extracting fire boundaries with GIS software, the sequence data of the gray model is determined. After comparing the accuracy of least squares estimation algorithm, least squares interpolation algorithm and ER algorithm, the forest fire spread GM(1, 1) model was established by ER algorithm and the accuracy of the model was evaluated. The experimental data showed that the models were fitted and predicted with high accuracy, with 50% of the first-level models, 25% of the second-level models, and 25% of the models between the first and second levels. Thus, it meets the need of forest fire suppression assisted decision making.

Keywords: *Forest fire spread model*, *Grey system theory*, *ER algorithm*, *MODIS image*

SECTION 4

Impacts of Climate Change on Hydrology and Water Resources

WRME003

The effects of precipitation, but not soil temperature, on leaf litter decomposition and mixed effects of two perennial herbs in desert steppe were studied in 5 years

H. Qu, C. Pan , X. Zhao, S. Wang, X. Ma and L. Liu

ABSTRACT

Leaf is the main component of litter, and often exists in mixed form in nature. The mixture of leaf litter decomposition was different with the mixture ratio. In comparison with other ecosystems, the degradation of leaf litter plays a more important role in the ecosystem, as it is not only an important biogeochemical cycle that connects mass and energy circulation, but also in maintaining the stability of desert ecosystems, even though the mixed effects of litter degradation in desert ecosystems remain unclear. In order to find out the mixed effects and influence factors of leaf litter degradation in desert ecosystems, a 5-year long term study was conducted to compare the observed and predicted degradation rates under the same and mixed conditions (SA1: 1) and natural ratio (SA4: 1) of two common and typical perennial herbs (Stipaklemenzii and Achnatherum splendens) in the desert steppe in North China, and also analysed the relation between the decomposition speed and precipitation and the soil surface temperature. The results indicated that: (1) The decomposition rates of SA4: 1 and SA1: 1 were significantly higher than those of SA1: 1 and SA1: 1, (2) SA4: 1 and SA1: 1 litter were significantly faster in summer and autumn than in spring, (3) SA4: 1 and SA1: 1 showed different results.

Keywords: Compound, Non-additive effects, Synergists.

ICED013

Analysis of Mine Deep Rock Mass Single Fracture Geothermal Water Seepage Flow

Yu. Jia, Y. Zhang

ABSTRACT

In this paper, the 2-D convection heat transfer law of underground water in one fracture of deep rock body is studied, and the heat transfer law of PKN model is calculated. Based on the variation of the opening degree of the fracture, we calculated the seepage flow of hot water in the rock mass with the change of the fracture angle. The results of the proposed experimental apparatus and the analysis of the experimental results indicate that: for a crack angle a = 0°, the leakage crack decreases with the increase of β, and the seepage flow decreases gradually to a steady value as β rises to 90°, at the fracture angle a = 90°, the crack of seepage flow increases with the increment of β, and the seepage flow becomes stable with the increase of β ~ 90°.

Keywords: Convective heat transfer, Geology condition, PKN model, Seepage flow, Single fracture.

WRME033

Numerical Research on Large Scale Water Lifting with Temperature Difference in Vertical Pipe

M.Lv, HQ.Liu, MQ.Xia, JJ. Wang, X.Nie, F.Wang, HM.Zhu

ABSTRACT

It is believed that the artificial lifting of water to form upwelling is a promising approach to the recovery of marine fishery. Numerical simulation is used to study the water-lifting system with temperature difference in the vertical pipe on a large scale. The results indicate that upwelling can be observed in the vertical pipe on the model of the ocean scale. The characteristics of the rising velocity are quite different for different ambient temperature ranges. It is very difficult to generate efficient upwelling in a long vertical pipe with large diameter at low power and relatively high ambient temperature. In some cases where the diameter of the pipe is fixed, the higher the ambient temperature and the higher the heating power, the more the water will be lifted up from the deep sea. Upwelling in vertical tube favors smaller tube diameter at low heating power. But for high heating power, the larger diameter pipe will be able to lift more water. In studied cases in this paper, a maximum flow rate of 8.8 m3/s was obtained for water lifting on large scales. Therefore, the technique of raising water through temperature differential is a promising technique for future applications.

Keywords:*Liquid Lifting, Temperature Differential, Vertical Pipe, Numerical Simulation*

WRME074

Nonlinear Drift in Spring Gravimeter Caused by Kunming GS15 Gravimeters with Air Pressure

J. Wei, W. Shen, H. Li, and Z. Liu

ABSTRACT

If gravity is observed in spring gravimeters due to the motion of the atmosphere and lithosphere, the analysis of the law of drift and the inversion method is of great importance. Apart from the linear drift of the spring gravimeter, the effect of the non-linear drift caused by the air pressure is not negligible. In this paper, 5 sets of 4 types of gravimeters have been analysed for more than 4 years under the same atmospheric pressure. The results show that the non-linear drift is mainly caused by constant temperature and atmosphere equipment and station type in Kunming GS15 gravimeter. Through the correction of the non-linear drift, it is found that the amplitude and period of the residual gravity are the same as those of the water load, which are simulated with GRACE and GLDAS. Therefore, the study and correction of the atmospheric pressure on linear motion in spring gravimeters is a sufficient method.

Keywords: *Data pre-processing, dewar, vav harmonic analysis, time lag, superconducting gravimeter, GRACE, GLDAS.*

ICED053

Groundwater Level and Spatial-temporal Evolution Characteristics in Victory Canal Irrigation District of China

Z.P. Liu, Y. SHI, Y.T. Zhao, Y.P. Han, X.T. Niu

ABSTRACT

Based on the observation data of ground water depth from 1993 to 2013, the spatial and temporal evolution of ground water level in the People's Victory Canal Irrigation District is analyzed by ARCGIS, SPSS, and Kriging, IDW interpolation and Spearman rank correlation. The results show that: the ground water level is decreasing from year to year, and the area of decreasing water level is increasing gradually, which makes the accumulated decrease of water level. Compared with 1993 level, the area of decreasing water level increased from 1483 square kilometers in 2000 to 1824 square kilometers in 2013. From 2000 to 2005, the maximum decreasing range of the ground water level was 0 ~ 2 m, and it took up 53.01% and 69.12% of the total area, and the trend was changed from 2010 to 2013: 2 ~ 4 m decreasing range replaced the diminishing 0 ~ 2 m area as the main trend, and the decreasing range increased to 60.05% and 59.38%, respectively. 55% of all observed sites show a dramatic drop in ground water levels, with 47% showing a very dramatic decrease. The area of rising water level is scattered in the southwest part of the irrigation zone, and the remaining 43 percent of the observation points show little evidence of decline or increase in the groundwater level.

Keywords: *Groundwater Depth, Groundwater Evolution, Spatial-temporal Differentiation, Spearman Rank Correlation Analysis*

WRME049

The Finite Element Analysis of Operation Period of En Zi Tan Aqueduct

LY.Sun,P.He,Z.Wang

ABSTRACT

Due to the uneven distribution of water resources in China, it has become an important component in the construction of water conservancy in China. Aqueduct, as the main hydraulic structure crossing the river and the transportation route, has significant significance in the design of aqueduct. En Zi Tan Aqueduct lies in Hunan Province, Shimen County. The main content of this thesis is the finite element analysis on the working cycle of the aqueduct. En Zi Tan Aqueduct has a design flow rate of 5. 3 3/s, 1/650 in length and 100 m long. The aqueduct is simple supported beam, the main body is reinforced concrete structure, the cross-section is U shape, and every section is 13 m long groove. Top of the tank for laying the bridge deck and railings in order to facilitate pedestrians. In this paper, we analyze the effect of the aqueduct on the working cycle, the variation of the stress and the deformation of the aqueduct, and the influence of the earthquake on the aqueduct.

Keywords:*Simple beam aqueduct, operating cycle, FEM.*

WRME050

Experimental Research on Motion Parameters of Uneven Bed Load on Rough Bed

LJ.XU,JH.Li,YJ.Wang,SM.Tian,XP.Zhang,EH.Jiang

ABSTRACT

The movement of bed load is complicated. It is important to extract the motion parameters of bed load accurately in theory study of bed load movement. Because of the difficulty of direct measurement of sediment movement in natural rivers, it is difficult to study the movement parameters of well bed load. A non-uniform sediment tank test on rough bed has been conducted in this research. The motion of uneven sediment on rough bed was recorded by the camera. Finally, we get the pixel coordinates of the bed load by using some method. The motion parameters of the bed load are computed by means of the program. The motion parameters included particle size, movement distance, movement and rest time, and velocity. At last, the dynamic parameters of bed load are analyzed by statistical analysis, and the motion law of uneven bed load is researched.

Keywords:*uneven sediment, bed load, parameter extraction, movement distance, movement/rest time, speed.*

ICED059

The Relation Between Diversity in the Waters Around Nanri Island of Pgytolankton and Environmental Factors

Y.Ye, Y. Luo, Y.Wang , M. Lin , P. Xiang

ABSTRACT

On the basis of the survey of Nanri Island in spring and fall 2011, the paper analyses the changes of species, abundance and diversity of phytoplankton, and discusses the relationship between the structure of phytoplankton community and the environment. The results showed that there were 106 species of phytoplankton belonging to 48 genera, among which diatom was the most abundant. Abundance in spring was significantly higher than that in autumn, ecological groups feature eurythermal and warm water species. The results showed that the marine environment of Huanghe Bay was highly heterogeneous, and the diversity of phytoplankton species was low. Salinities and nutrients, as the two main factors affecting the distribution abundance of phytoplankton, had significant correlation with the abundance of phytoplankton in spring. In comparison with the data from the islands survey of 1990 to 1991, the dominant species consisted mainly of a small number of species, succeeding in the dominance of both the dinoflagellates and the diatom.

Keywords: *Phytoplankton, Nanri Island, Environmental Factors*

The Series Variational Characteristics and Causes of Changing Environment in the Tarim River Basin Runoff

ICED067

X.Y. Zhang, Q.T. Zuo

ABSTRACT

The Tarim River, which is mainly fed by the source rivers, is one of the typical inlanders in China. On the basis of the measured hydrologic data and the Mann-Kendall nonparametric test, this paper takes' 4 origins and 1 main stream 'of Tarim River Basin as the object of the study. The results show that there is an upward trend in temperature and rainfall in the Tarim River Basin. The annual runoff from the Aksu River, the Kaikong River, and the Yarkant Riverall of the four primary rivers of the Tatar River have a marked upward trend, with the former showing a marked increase, whereas the annual runoff from the Hotan Riverdemonstrates a slight increase. Affected by human activities, the annual runoff in main body of Tarim River has been reduced. The Tarim River Basin is mainly fed by glacial and snowmelt due to its unique geography and basin structure. While increasing precipitation and increasing glacier cover will ensure that there is sufficient runoff in the source area in the future, the region's water resources will face severe challenges in the long term.

Keywords: *Tarim River, changing environment, runoff changes, trend test, mutation diagnosis*

ICED037

Analysis of spatial and temporal evolution of agricultural drought based on regional agricultural drought index

F. Wang, M. Sun, S. Lü, and Z. Zhou

ABSTRACT

In recent years, the frequency and intensity of droughts in China have been on the rise, and most of the grain-producing provinces are located in drought-prone areas, and agricultural drought has become one of the major factors limiting agricultural production in China. Taking Henan Province as the study area, we analyzed the change trend of agricultural drought area in Henan Province and evaluated the spatial and temporal evolution characteristics of agricultural drought in Henan Province based on the regional agricultural drought index. The study showed that the interannual variation of the agricultural drought index showed a decreasing trend year by year (trend rate of -0.12/10a), indicating that the degree of drought decreased year by year. Eastern and southern Henan, eastern and northern Henan, and northern and eastern central Henan are mild drought areas, eastern Henan, western and northern Henan, and western central Henan are moderate drought areas, western Henan, western Henan, and northern Henan are severe drought areas.

Keywords: *Agricultural drought, regional agricultural drought index, evolution characteristics.*

ICED040

Comparison of linear model and nearest neighbor method for predicting macroinvertebrate communities in urban rivers of Beijing

L. Yang, X. Bai, and Y. Hu

ABSTRACT

Macrobenthic invertebrates play an important role in the material and energy flow of river ecosystems. In this paper, a linear model and the K-nearest neighbor method for predicting macroinvertebrate biodiversity in urban rivers were developed using data from the Wenyu River.Both the Shannon-wiener index and the Simpson index were used to measure macroinvertebrate biodiversity. The prediction models were developed and validated using the observed data of macroinvertebrates and 12 water quality indicators in the Wenyu River from 2010 to 2012. The results showed that:1) the validity of the linear model, although imperfect, was superior to the K-nearest neighbor method in predicting macroinvertebrate diversity using water quality indicators, 2) the Simpson index was more robust and accurate than other biodiversity indices as a variable for predicting benthic invertebrates in urban rivers. There were 89.47% of the observations within the 99% confidence interval. The developed predictive model is a useful tool to assess river health, especially urban river health, without considering invertebrate abundance.

Keywords: *Macroinvertebrates, linear model, K nearest-neighbor, biodiversity.*

SECTION 5

Green Renewable Energy

ICED002

Reservoir Electric Power Generation Based on the Functional Dynamic Programming Algorithm Optimal Scheduling System

C. Ji, H. Wu, C. Li

ABSTRACT

Some scholars have used the traditional dynamic programming (referred to as DP) algorithm mining-optimal scheduling. This method can get much more accurate than optimal solution, if the dispersion of reservoir capacity is greater. But there are some problems such as big calculation scale and long calculation time.

To increase the efficiency of solution, functional analysis is introduced. It is highly abstract and universal. On this basis, a modified DP is proposed. It can eliminate an infinite number of repetitive calculations and reduce the scale of calculation. This is the traditional DP innovation. As an example, M hydropower station located in Southwest China. The results show that the improved DP can reduce the computation scale of the dynamic program and reduce the computation time obviously compared with the traditional DP.

Keywords: *Dynamic programming (DP), Functional analysis, Linear operator, Mapping, Reservoir scheduling.*

ICED003

Analysis of Input Factor Contribution of Energy Service Industry Based on Economic Growth Model

R. Li, H. Huang, J. Dong

ABSTRACT

In the context of sustainable development, and in order to adapt the economy, adjust energy structure and environmental demand, the energy service industry has been paid more and more attention and development, however, the present energy service theory system is not perfect. Economic Contribution Degree Analysis of Energy Service Industry can help the Industry to break the bottleneck, promote the development, and obtain more social and environmental benefits. Based on the model of economic growth, this paper analyses the contribution ratio of input factors and its impact on social economy. The results show that the contribution ratio of enterprise growth is the highest, and the second is capital investment and labour investment. The result has a positive meaning for the current development of the energy service industry in China. Meanwhile, the research framework and methods proposed in this paper can be used as a reference for other industries.

Keywords: *Energy services industry, Economic growth model, Production function, Input factors, China.*

WRME012

Comparative analysis of three kinds of shrubs by TG, FTIR,GC-MS andTDS-GC-MS

M. Li, J. Zhang, Y. Liu, K. Li, Z. Zhang and W. Peng

ABSTRACT

In this paper, Prunus trilobata, Hongji Mu and Huang Jing Mu were chosen as the research object. In this paper, TG, FT-IR, andGC-MS, and TDS-GC (TDS-GC-MS) were used for analysis of organic solvent extraction from three species of wood. The TG, FT-IR fingerprint and GC-MS analysis table of various wood were set up by statistical methods. The results showed that there was a general agreement between the three types of TG maps and FTIR prints, but there were some differences in details. These differences are beneficial to the division and rational combination of three kinds of wood resources in scientific utilization. Meanwhile, the chemical components of these three woods were compared by GC-MS. The results indicated that the chemical composition of the three woods was similar, and they had a significant effect on the medical and other fields. Through GC-MSanalysis, it can be used in the fields of medicine, perfume, chemistry and fine chemistry. Based on the results of TD-GC-MSanalysis, we can learn more about the three types of wood components and their functions, advantages and disadvantages. Therefore, it is possible to make more scientific, healthy and rational use of these three types of timber.

Keywords: TG； FT-TR, GC-MS, Extracts, Ligustrum quihoui Carr, Loropetalum chinense var.rubrum, Vitex negundo L.

ICED008

Solar Energy Thermal Jet Refrigeration System

L. Cai, X. Wang, N. Dai, Q. Huang, Z. Tan

ABSTRACT

The technology of solar energy cooling has become a hotspot in recent years. Traditional solar cooling technology is based on PV, but it has not been widely applied due to its low energy conversion efficiency and high energy consumption. In this paper, a kind of jet cooling system based on solar photothermal principle is presented. The general structure and operation principle of this system are presented. Furthermore, a mathematical model is developed for the heat exchange of the core parts. Then the main components of the photothermal subsystem and the refrigeration subsystem are designed. The choice and design method of solar collector, generator and ejector are described in detail. Engineering experiments show that the error of COP theory is below 5%, which is 3 times that of the conventional solar cooling technique.

Keywords: *Cost of power, Ejector, Heat exchange model, Photothermal cooling, Solar energy.*

ICED015

Study on Wind Heating System Wind Turbine Aerodynamic Characteristics

L. Cao, B. Li, T. Jiang, Z. Zhang, L. Zhang

ABSTRACT

Based on the theory of aerodynamics and the NACA Series Airfoil, the paper analyzes the vertical axial wind turbine of the wind turbine of the wind turbine. The curve of wind energy utilization coefficient of wind turbine is obtained by rational correction. Based on the operation features of the wind turbine, the reliability of the wind energy heating system installed in some region is analysed. Finally, some suggestions on the system configuration are given. On the basis of the wind energy efficiency curve, the description of the variable speed operation of the wind turbine will be effective in increasing the efficiency of the wind energy.

Keywords: Aerodynamic characteristics, NACA series airfoils, Vertical axis wind turbine, Wind energy heating system, Wind energy utilization coefficient.

WRME056

Managing and Scheduling Approximate Applications of Cloud Computing Datacenters to Utilize Renewable Energy

G. Zhang, X. Wang, and M. Yang

ABSTRACT

Along the rapid development of cloud computing, the power consumption of datacentersis getting much higher in recent years. Renewable energy is promising as a source of energy for data centers, as it can significantly reduce the consumption of conventional energy sources. In order to improve the efficiency of the data center, we proposed a number of adaptive scheduling algorithms to manage the data in the datacenter, based on their performance and accuracy. The algorithms are based on different priorities, precisions and running times of the target application srespectively. Since the amount of energy generated varies with time, the proposed algorithms can be used more efficiently by tracking the energy fluctuations. The experimental results indicate that the efficiency of energy utilization can reach 91.9318%, 91.9266%, 91.9266% and 91.9225%, respectively. The results show that the adaptive scheduling algorithm can not only make full use of the available energy, but also ensure a reasonable service quality for users.

Keywords: *Renewable energy, approximate applications, adaptive scheduling, cloud computing datacenter.*

ICED019

Waste Heat Power Generation Automatic Control System

C. Pan

ABSTRACT

China is a big country producing and consuming cement, which causes high levels of environmental pollution and energy consumption in the production process, which is in contradiction with the objective of low energy consumption and high environmental protection. Cement production accounts for over 35% of the heat loss, and if this fraction is recycled, it will make a real difference. In this paper, the present situation and mechanism of CHP are analyzed. Taking the waste heat recovery and utilization of the new dry process cement production as the research object, the design and construction of the CHP automatic control system are discussed. The test results indicate that the system is effective in automatic control.

Keywords: *Cement production, Waste heat power generation, Automatic control system, DCS.*

ICED020

A Study of Kitchen Waste Solid State Fermentation to Produce Acid Protease from Aspergillus Niger

S. Zhang, H. Cheng, N. Chen

ABSTRACT

In this paper, Aspergillus niger was used as main material to produce acid protein by solid state fermentation (SSF). The SSF conditions were studied and optimized. The influence of water content in SSF medium, inoculum size and fermentation time on acidprotease activity was investigated by one factor at a time method. Based on the results obtained, the optimum conditions for the production of c acid protease were optimized by orthogonal array design to be 30 grams, initial water content 20 ml, inoculum size 4 ml, fermentation time 70 h.

Keywords: *Kitchen waste, Aspergillus niger, Solid state fermentation, Acid protease.*

ICED023

Service Life Forecast of Composite Geomembrane Based on Hydrothermal Aging Test

M. Zhang， H. Yang， Y. He， C. Dong， W. Yang， J. Zhang， X. Liu， Z. Zhang

ABSTRACT

The mechanical properties of 150 g/m^2, 0.3-150g/m^2 composite geomembrane were investigated in this paper. Based on Arrhenius heat aging acceleration model, the failure criterion is reduced to 20% of its original performance. The moisture accelerated aging model of compound geomembrane was established, and its service life was predicted under the natural environment.

Keywords: *Composite geomembrane, Hygrothermal aging test, Tensile strength, Failure criterion , Service life.*

ICED052

Effects of the Energy Consumption on Building Density and Pavement Albedo in a Typical Residential District

W.X, L. W. M. L. Y. F.

ABSTRACT

In this paper, a numerical simulation was performed to study the influence of building density and pavement thickness on the energy consumption of a typical residential area in the hot and humid climate of South China. In this simulation, the wall of the building is equivalent to a transparent wall, and the energy consumption of the building is assessed based on the performance of the air-conditioning system.The results show that an increase in the density and/or the albedo of the floor will result in a higher amount of solar radiation in the building and therefore a higher energy consumption of the building.

Keywords: *numerical simulation, building density, pavement albedo, residential district, energy consumption*

WRME036

The Dynamic Evolution Characteristics And Mechanical Mechanism of Closed Distance Deep Coal Seam Group in Surrounding Rock

JZ.Li, ZH. Jiao, M.Zhang, Y.Li

ABSTRACT

The dynamic behavior and mechanics mechanism of coal seam group mining is the important theory foundation for the safety exploitation of deep seam group. The time and space evolution of 3-D mining stress field and the movement rule of strata in the deep coal seam group were investigated by means of analogy and numerical simulation. The results show that: In the early mining process, the initial stress equilibrium was broken, and some of the surrounding rock stress was released, which resulted in a free space in the rock body. The rock mass was moved to the goaf, and the pressure was relieved and the rock mass was protected. A caving arch was formed in the overburden layer, and the arch track was formed by the dividing line and the rock beam. Along with the continuous progress of the slab, the strata exposed in the caving arch were transferred to the top layer, and the separated strata were also propagated upward, which resulted in the periodic destruction of the caving arch. In the course of mining, the strata have gone through the collapse and the natural filling process, the main roof is damaged, and all the strata in the coal seam have collapsed or broken, and are connected to the goaf in the overburden. Therefore, the fractured rock mass in goaf directly transferred the load to the bottom, and then the period pressure was relaxed. The results can be used as a reference for the joint mining of coal seam groups under similar conditions.

Keywords:*Coal Seam Group, Repetitive Mining, Surrounding Rock, Fracture Evolution, Mechanical Mechanism*

ICED058

Feasibility Study for Dead Band Wind Turbine Startup Speed

Z. Liu, Z.Yin, Z. Chen, S. Su

ABSTRACT

Wind turbines are usually designed and operated with fixed startup speed. It could start and shut down repeatedly when the wind fluctuates around the startup speed. Excessive stress due to frequent start-up and shutdown could increase the likelihood of component failure and negatively impact the availability of a wind turbine. In this paper, we put forward the startup speed with the dead band, in order to avoid the frequent startup. The five year wind data from 15 wind farms are analysed to assess the reduction in start-up times and potential losses of wind energy generation. Numerical simulation shows that start-up times could be halved with a negligible reduction in potential wind energy production at most of the sites under investigation once a suitable dead zone is adopted.

Keywords: *Wind power, Times of startup, mean wind speed, consecutive shutdowns, Loss in power production,*

WRME048

The Dynamic Regulation of Scenic Area System From the Perspective of Ecological Civilization in Natural Environment

YY.Luo,Y.Lu,Y.Qin,Z.Wang

ABSTRACT

Ecological civilization is an organic unity of theory and practice. The ecological civilization of natural scenic areas has received extensive attention from scholars at home and abroad in recent years. This paper explores the connotation of ecological civilization of natural scenic area system and constructs a natural scenic area system model based on system dynamics. In addition, this paper takes Jiuzhai Valley as research object to regulate and analyze the key factors that may affect ecological civilization construction in scenic areas, explores scenic area development trend under different strategies, and provides a basis for the promotion of ecological civilization construction in natural scenic areas.

Keywords:*MSW landfill, nonpoint source, working area, odor emission rate, wind tunnel,*

ICED027

An Economic and Environmental Costs Computing Model of Consuming Abandoned Wind Power Heating

W. Wang, H. Wang, Y. Sun, and W. Luo

ABSTRACT

Although wind energy resources are quite abundant in northern China, the abandoned wind rate has been kept at a high level due to the electric-heat coupling of CHP machines during the heating period. Using abandoned wind power for heating is conducive to reducing the amount of abandoned wind power generation in northern China, developing the ability to use wind power and reducing pollution. In contrast, wind power heating is less economical and has lower pollutant emissions due to higher construction costs. Environmental costs are calculated, converted into monetary costs, and then economic costs are added. The consumption cost of waste wind power heating includes the reduction of the cost of wind farm power generation and the economic and environmental cost of thermal storage electric heating. Considering the environmental protection of wind power generation and the reduction of wind farm generation costs, it is more comprehensive and reasonable to compare not only abandoned wind-generated heating with combined heat and power heating, but also to plan wind-generated heating jointly with traditional heating methods.

Keywords: *Consuming abandoned wind power heating, economic costs, environmental costs, thermal storage type electric heating*

ICED033

Health Assessment of Forest Ecosystem Based on Fuzzy Evaluation Method —— A Case Study of Forest Ecosystem in Liangshui Nature Reserve

N. Tao, D. Liu, and J. Wu

ABSTRACT

On the basis of establishing the evaluation index system of forest ecosystem health in Liangshui Nature Reserve, the weight of each index was determined by AHP and questionnaire survey, and a fuzzy evaluation model of forest ecosystem was established to evaluate the health status of Liangshui Nature Reserve from 2007 to 2013. The results showed that the health status of the forest ecosystem in Liangshui Nature Reserve changed from 2007 to 2013, showing a downward trend, which was consistent with the changes of the internal and external environment of the forest ecosystem in Liangshui Nature Reserve.

Keywords: *Forest ecosystem, health assessment, analytic hierarchy process (ahp), fuzzy evaluation method.*

ICED043

Analysis of Capacity for Distributed Photovoltaic Power Station Accessing to Power Distribution Network in Central Tibet

X. Jiang and C. He

ABSTRACT

It is very important that the capacity of distributed PV power plants connected to the distribution network should meet the relevant requirements and consider the impact on the distribution network currents and voltage deviations when designing. According to the characteristics of the distribution network grid structure in Tibet, a typical distribution network simulation model is established, and the effects of distributed PV power plants connected to the 10KV distribution network using three schemes respectively on the distribution network currents and voltage deviations are analyzed. The analysis shows that: (1) when a dedicated access with an installed capacity of 5.2 MWp is used, the distributed PV plant has no effect on the distribution network tide and voltage deviation, (2) when a T access with an installed capacity of 1.5 MWp is used, the distribution network tide variation and voltage deviation meet the relevant requirements, (3) when a user-side access with an installed capacity of less than 0.2 MWp is used, there is no effect on the distribution network tide and voltage deviation are not affected.

Keywords: *Distributed photovoltaic, capacity, power distribution network in central Tibet.*

ICED076

Heat Storage Technology Accommodating Wind Based on LCA and Calculating Pollution Equivalent for Electric Heating

W.Wang, W. Peng, Y. Sun, W. Luo

ABSTRACT

Electric heating combined with heat storage technology can effectively reduce the waste wind in northern China, and increase the consumption of wind energy. In view of the poor economic and single performance of the electric heating system, this paper applies the life cycle evaluation method to analyse every phase of the boiler, including production, transport, construction, operation and dismantling. At the same time, the pollution emission of each phase is calculated and compared with that of combined heat and power, so as to analyse its advantages and expansibility. The results indicate that the electric heating system using the waste wind energy can achieve a significantly lower pollutant discharge than the combined heat and power system. Therefore, from the angle of environment protection, it is very important to use the heat storage technology in the northern part of China, which has been abandoned.

Keywords: *wind power, electric heating with heat storage,pollution discharge, life cycle assessment*

WRME086

Ocean Wave Energy Tecnology And Its Offshore Utilization

Z.Y. Zhang, B. Wu

ABSTRACT

Large scale utilization of wave energy has been a continuous dream of mankind in recent hundreds of years. In this paper, wave and wave energy utilization are presented.

For wave energy utilization devices, Oscillating Water Column, overtopping, point absorber and raft-type are more common. The wave conversion principles are also presented. In addition, four research issues of general concern to the international wave energy community are raised in developing procedure of Wave energy Device. It is significant that people research the Islands. Study found that: under the average water level, the reef cap is usually submerged in shallow water, wave action before the reef slopes, the nonlinear effect, light waves in the reef cap are prone to breakage and loss a lot of energy, the broken wave propagation on the reef flat after a certain distance to regenerate the vertical coast direction. Furthermore, Offshore energy islands are seen as the future of large-scale use of renewable energy in the ocean.

Keywords: Wave, Wave utilization, Island, Wave Evolution, Offshore utilization.

SECTION 6

Geographical Environment

WRME016

Phytoncide Components of the Major Economic TreeSpecies in Southern China and Forest Medical Benefits

Y. Wang, B. zhou, S. Liu and D. Zhang

ABSTRACT

Phytoncide refers to the aromaticity of trace substances plants emit during germicidal or other biologicalactivities. Aroma can be helpful to microbes, prevent plant diseases, and insect pests. A wide range of tree species have been applied in the bio-medical and medical fields, and have been applied to urban landscape planning. There are a number of economic tree species in South China, but limited knowledge of the phytoncide composition of different species limits in-depth study and restricts phytoncide 'applications in forest medicine and other capacities. The main economic tree species of South China (Cinnamomum camphora, Zelkova serrata, Camellia oleifera, Eucalyptus dunnii, Vernicia fordii, Dalbergia hupeana, bamboo, Liriodendron chinense × tulipifera, Cupressus funebris, and so on). Among them, Liriodendronchinense × tulipifera, Eucalyptus dunnii, Cinnamomum camphora, Camellia oleifera, Bamboo, and Otherell Conomic Tree have more vegetables.Most species exhibit biological activity, as well as good health care in the forest. The leaves can also be used as biological medicine, as well as in rare spices and herbs, as well as as the ingredients for high-grade cosmetics. The plant phytoncide components of Zelkova serrata, Cupressus funebris, Dalbergia hupeana, and Vernicia fordii are relatively small, but their leaves contain a high proportion of active biomedical components and strong forest medicinal properties. Thus, these economic tree species in South China can be used extensively in the planning of urban green spaces and for the rehabilitation of forest lands.This species not only has significant economic value, but also has obvious therapeutic effects in the forest.

Keywords: Phytoncide, Forest Medicine, Economic Tree, Biology, Landscape Engineering.

WRME051

Changes in Land Use/Cover and Landscape of Zhalong Wetlandas "Red-crowned Cranes Country", Heilongjiang Province, China

M. Geng, D. Liu

ABSTRACT

Hydrological andecological role of wetlands were becoming significant. On the basis of Landsat satellite remote sensing data collected in 1990, 2000 and 2014, as well as integrating GIS using the Landscape Ecology Analysis Method, the study on the change of the Land Use/Cover and Landscape Pattern of the Zhalong Wetland between 1990 and 2014 was carried out. Then, we analyzed the impact of human activity and climate change on land-use/coveres. The main findings were: a. Significant changes in land use/cover have taken place in Zhalong wetland during 1990-2014. The number of cultivated land, unutilized land and construction land has increased continuously, and the area of reed marsh, wetland, grassland and wetland has decreased correspondingly, b. The shape of the landscape has become more irregular and more complex, there has been a trend of increasing diversificationand homogenization of land use change and the growing of landscape patternin Zhalong wetland, c. There was a warm-dry climate trend from 1958 to 2014, d. Human activities including population, construction, water land pollution and production have been threatening the wetland ecosystem. Those changes in Zhalong area were caused by nature and human activity. However, the contribution of the human race is huge.

Keywords: *Climate change, human activities, landscape, Zhalong Wetland.*

ICED006

A Comparative Study between Kuwait and Hotan Region on Environmental Policies to Combat Desertification

Y. You, J. Lei, Y. Wang, X. Xu

ABSTRACT

One of the most pressing environmental problems in the world is desertification. The environmental problem of desertification can be solved by improving the management of the environment and policies, which are considered as the most efficient means to combat desertification. This study makes a comparative analysis of the implementation of DLDD in Kuwait and the Hotan region of China. Since the natural causes of desertification in the two regions are largely the same, the comparison focuses on policies to control the human factors that cause the problem. Comparisons show that the policy of desertification in Kuwait and Hotan is different in five respects: the role of local government, legislation and regulations, timeliness, public involvement, and government financing of forestry. The aim of this study is to share China's "top-down" model for implementing the environmental policies designed to combat desertification. Results demonstrate the Chinese "top-down" model might be applied in Kuwait to combat desertification and dimprove environmental management. While Kuwait and Kuwait differ politically and economically, they are both affected by desertification and the fight against desertification as an integral part of their national operations.These are the preconditions for a comprehensive strategy and a comprehensive project to combat desertification. Kuwait and China should thus enhance their collaboration and communication, and make a joint effort to combat desertification via environmental policy management.

Keywords: *Comparative study, Environmental Policy, Desertification, Kuwait, Hotan.*

ICED011

The Analysis on the Features of the Environment and Construction Mode of the Yi Settlement and Proposition

R. Yang, Z. Qin

ABSTRACT

The Yi nationality is an old and glorious people. It has taken root in the Sichuan Basin, fed by the Jinsha River and Anning River, and has formed a lot of unique and brilliant ethnic culture in its long national development. The rural, impoverished and backward traditional Yi Nationality is confronted with the modernization in both material and spirit. The update of the Yi traditional local-style dwelling house and small town construction pattern blindly follows the trend of big and medium city construction. Due to the economic development and natural disasters caused environmental damage, the traditional Yi residence style was destroyed, the living environment of the Yi people changed, and the Yi residence also lost the old building characteristics and superiority. With time, by requirement and development, national culture have been blended. Inprovingyi residents' income and living level, it is an urgent task to construct the living environment for Yi's culture. In this paper, the characteristics of the Yi village in Pangang are analyzed, and the general construction model is proposed in the course of modernization.

Keywords: *Yi, architectural feature, constructing mode, proposition.*

ICED034

Typological Characteristics of the Distribution of Typical Dwellings in Northern China Under the Influence of Geomorphological Factors

Q. Liu and B. Shang

ABSTRACT

This study takes the northern region as the research object, contrasts and analyzes the types and distribution patterns of dwellings distributed in different climatic zones, architectural heat zones and geomorphological zones, and classifies and subdivides the types of siheyuan architecture based on the existing research on typical dwellings in the northern region, and classifies the siheyuan into Beijing-Ji style, Jin-Shaan style and Manchu style according to the research results of the group. The distribution of the types of typical northern dwellings in China was also mapped according to different geomorphological regions. On the basis of this, a comprehensive case study was conducted to map out the distribution of types of typical northern residential houses. It lays a certain foundation for the study of green building technology elements of traditional dwellings, further reveals the close relationship between local characteristics of dwellings and natural environmental attributes, and at the same time demonstrates the typical values and local characteristics connotations of dwellings in different regions based on natural zoning.

Keywords: *Traditional Northern Dwelling, Type traits, Geomorphological Region, Distribution.*

ICED039

Coupling Modeling Between Soil and Crop Spectral Characteristics based on Plant Growth index and Entropy Theory

M. Xiang, W. Yang, and J. Yang

ABSTRACT

Quantitative inversion of soil quality is a hot topic in soil science and environmental science research, but it is difficult to obtain high-precision soil spectral information without attachment interference. Therefore, based on the synergistic changes between soil quality and crops, a parametric model of soil environmental factors and crop spectra at different growth stages was constructed by using entropy theory and spectral vegetation index with the help of hyperspectral imaging and visualization of spectral integration. Crop spectral characteristics parameters were used to indirectly indicate soil quality. The results show that crop growth is influenced by a variety of soil environmental factors. In addition, the characteristic spectral bands of the crop were located near 450, 500, 520, 550, 670, 730 and 800 nm. As the crop growth proceeded, its spectral reflectance gradually decreased, and the red edge slope and red edge position and red edge slope also showed a blue shift phenomenon. The inversion was better at the uprooting stage, and MCARI/OSAVI was the best vegetation index. The model based on entropy theory ($r=0.917$, $sig<0.01$) had higher inversion accuracy than the widely used average spectral vegetation index model ($r=0.829$, $sig<0.05$). The S-SECI validation model was constructed and was found to be positively correlated. In addition, the inversion results were highly coupled with the measured soil quality conditions, indicating that the dual judging model based on entropy theory and spectral vegetation index is helpful for remote sensing monitoring of soil quality.

Keywords: *Soil environmental factors, crop, vegetation indices, information entropy.*

ICED070

The Nutrient Variation Characteristics of Summer in Luanhekou — Beidathe Ecological Monitoring Marine Area

Z. Li, L. Cui , Z. Zeng

ABSTRACT

Data from 24 sea monitoring stations in the Luanhekou-Beidaihe Ecological Monitoring Sea Area between 1999 and 2014 show significant changes in the nutrient composition of the area. The average N: P ratios have increased from 4.951 in 1999 to 47.188 in 2014, theSi: N ratios have decreased. The nutritional composition has changed significantly in the last 16 years. Before 2004, there was a relative surplus of phosphate, but there was a relative shortage of inorganic N, and there was a relative surplus of inorganic N and P in the post-2004 period. Water quality has changed from low nitrogen and high phosphorus (prior to 2004) to high and low phosphorus (after 2004). These findings suggest that the nutrient composition might be related to human factors.

Keywords: *nutrient, summer, water quality, Luanhekou-Beidaihe Ecological Monitoring Marine Area*

ICED042

Principle and applicability of cosmic ray neutron method for soil moisture measurement

H. Zhang, Y. Zhao, F. Wang, and D. Ma

ABSTRACT

Regional soil moisture monitoring has been a difficult task in many studies. Traditional point measurements and large scale remote sensing monitoring always fail to obtain small and medium scale regional soil moisture information. The cosmic ray neutron method, as a novel method for monitoring soil moisture conditions at the mesoscale, can obtain soil moisture information within a 300-mile radius of the earthquake source area, which makes up for the shortcomings of point measurement and remote sensing methods. In this study, the cosmic ray neutron meter (CRS) was used for continuous monitoring of soil moisture, and the applicability of the cosmic ray neutron method in soil moisture monitoring was investigated. The results show that the CRS and time domain reflectometer (TDR) measurements have high agreement with a fit of 0.847 and a root mean square error of 0.020 kg/kg. In addition, CRS is very sensitive to precipitation and can clearly show the increase of soil moisture under different conditions, while TDR is relatively less sensitive. This study can provide a reference for monitoring the dynamic changes of soil moisture at regional mesoscale.

Keywords: *Soil moisture, CRS, TDR, mesoscale, precipitation*

ICED072

On the Construction of The Construction of Phytoplankton Community in Coastal Engineering Incaofeidian Sea

Z. Li, L. Cui

ABSTRACT

In order to test the response of phytoplankton community to the construction of coastal engineering, a comparison analysis was carried out for the year 2003 (pre-construction), 2007 (mid-construction), 2009 (late construction), 2012 (two years after completion) and 2014 (four years from completion). The results show that the dominant species in the Caofeidian Sea have changed from Bacillariophyta (2003) to Bacillariophyta and Pyrrophyta (2014). The response process of the phytoplankton community in the Caofeidian Sea showed that the dominant species in 2003, Pseudo-nitzschia pungens in 2007, Pseudo-nitzschia pungens and Noctiluca scientillans in 2009 and 2012 respectively.

Keywords: *coastal engineering construction, phytoplankton, community response, Caofeidian Sea*

ICED075

The Myth of Applying Complex Forecast Models-AComparison for the Electric Power Consumption of ARIMA, ANNs and Hybrid ARIMA-ANNs

S. Lai, K. Kuo, M. Liu

ABSTRACT

Management of energy is essential to the future economic development and the protection of the environment. The growing international demand for energy requires the development of intelligent forecasting approaches, and the management of energy resources in the best way is essential to energy planners and policy makers. This study compares the forecast performance of electric power consumption in Singapore based on an ARIMA model, Artificial Neural Networks (ANNs), and ARIMA-ANNsmodelsfrom1971 through 2010. The study considers four variables of the economy and demography: population, GDP, exports and total visitor arrivals. The results indicate that ARIMA is very accurate in predicting electricity consumption in Singapore, which is better than ANNs and ARIMA-ANN. Univariate ARIMA, which requires no predictors, has the advantage of simplicity, but still provides a poor and efficient forecast. The strict linear trend of Singapore's electricity consumption suggests that ANNs and hybrid modeling are not appropriate. It has been shown that the linearity of the data series is an important factor to be taken into account in the application of ANNs and hybrid approaches. The inclusion of more explanatory variables as inputs into ANNs does not improve the prediction performance, but makes the estimate more complex. It is more important to choose proper predictors than to increase the number of ANN estimates. The results also indicate that ARIMA and ANNs are still possible to obtain high precision for small samples. In most cases, this is necessary in a number of practical situations in certain areas.

Keywords: *Autoregressive integrated moving average (ARIMA), Artificial neural networks (ANNs), Electric power consumption, Forecast, Singapore.*

SECTION 7

Development of Ecological Analysis Methods for Pollutants

WRME005

Collaborative based Expensive Optimization Algorithm for Pollution Source Identification Problem on Water Supply Network

X. Yan , K. Yang, C. Hu and W. Gong

ABSTRACT

In order to avoid the occurrence of water pollution, it is necessary to set up water quality sensors in the key nodes or water sources in the water supply system. However, in the event of an incident of pollution, the accuracy of the location of the pollution source and the prediction of the location of the pollutants, the time of injection, the duration of the injection and the quality of the injection are the challenges. The current popular pollution source identification model, the simulation optimization model, has been studied in depth, and it has been found that identifying the source of pollution in the water supply network is a costly optimization problem. In this paper, the problem of pollution source identification is transformed into a costly problem to solve. Based on the features of the problem, a collaborative cost optimization algorithm is presented. Based on the features of water supply network, a more appropriate strategy is proposed for each of the different variables, which can be used as guidance. The algorithm makes use of the Gaussian process surrogate model to ensure the location precision as far as possible. Finally, the effectiveness, efficiency and stability of the algorithm are verified by simulation.

Keywords: Pollution Source Identification**,** Expensive Optimization Algorithm**,** Gaussian Process Surrogate Model**,** Water supply network, Simulation-optimization.

WRME011

Analysis of the effective components of Ligustrum quihoui Carr

K. Zhu，X. Zhang, J. Li, C. Shi and Z. Zhang

ABSTRACT

The volatile components of Ligustrum quihoui were extracted by steam distillation and supercritical CO2 extraction respectively. The chemical components of Ligustrum quihoui Carr were determined by GC/MS (GC-MC). Thermogravimetric analysis was carried out byDSC-TG. In this paper, the main constituents and contents of Ligustrum quihoui Carr were determined by FTTM infrared spectroscopy. Using areanormalization method, the relative content of the components was determined, and the results of the extraction were compared.

Keywords: Ligustrum quihoui Carr・GC-MS・TDS・TG・FTIR.

ICED018

The Relieving Effects of Shelter Modes on Physiological Stress in Outdoor High Temperature Environment

G. Zheng, Y. Wang, W. Bu, Z. Li, B. Wei

ABSTRACT

The temperature and humidity are high in summer, and they both persist for a long time. Nevertheless, sanitation workers, traffic police and other outdoor workers continue to hold their jobs in order to maintain the normal activities of the society. Therefore, the health and safety of outdoor workers are being challenged by hot weather. In order to protect the workers' safety in the high temperature environment, some protective methods such as tree shade, sunshade and sunshade were chosen for the sanitary workers (walking) and the duty-traffic police (standing). By comparing the physiological parameters of the three types of shelter, the relief effect on the physiological stress of the different shelter modes is analysed. The results indicated that the shade and sunshade had a good effect on the physiological stress relief. And sun has as no effect on relieving physiological stress, although it avoids the direct sunlight on the face. But it also leads to an increase in heat shock, which may offer an important way to protect the health of workers in the outdoor high-temperature environment. It also provides theoretical support for the revision of the Occupational Safety Standards for Outdoor Exposure.

Keywords: *Outdoor high temperature environment, Physiological response, Relief, Shelter, Tree shade.*

WRME029

Molecules and Indoor Atmosphere Effect of Rosewood: *Dalbergia melanoxylon*

J.Yang, JT Chen, CY.Ni, JW Lou, ZL.Liu, WX.Peng

ABSTRACT

The extraction of organic solvent was studied with FT-IRandGC-MS. The analysis of Dalbergia melanoxylon was performed by TG, Py-GC-MS and TDS-GC-MS. Subsequently, the pyrolysis products are analysed by GC-MS.The results indicate that there are many bioactive components in D. melanoxylon extract, including alkanes, phenols, alcohols, esters, aldehydes, ketones and aromatic compounds. Melanoxylon is healthy and plentiful. Asarone, retinol, D-allose, creosol, vanillin, benzaldehyde, nonanal, catechol, furfural, apocynin, hematoxylin, cedrol, etc. Furthermore, it has potential applications in biological medicine, cosmetics, cosmetics, cosmetics, and spices. Melanoxylon provides scientific evidence for exploitation and utilization of this plant.

Keywords:*GC-MS, Py-GC-MS, TDS-GC-MS*

ICED055

Protection Characteristics Fuzzy Evaluation Method of Oil Tank Circuit Breaker

Y. Qiao, X. Su

ABSTRACT

In this paper, a new fuzzy evaluation method for protective performance of circuit breaker with oil dashpot is put forward. First of all, the protective properties of the circuit breaker with oil dashpot are tested, and the working time and the protective characteristic curve of the circuit breaker with oil dashpot are obtained. Secondly, the measured action time is regarded as the evaluation index, and the average value of the standard action time is used as the optimum value of the evaluation target. Then, the protective performance of the circuit breaker with oil dashpot is evaluated by using the triangle and normal distribution. Finally, the comparison between the two evaluation results and the actual situation shows that the synthetic evaluation method of fuzzy normal distribution is more reasonable. It is proved that this method is feasible to evaluate the protective performance of PCB with oil dashpot. It can be used to evaluate other similar products' protective performance.

Keywords: *circuit breaker with oil dashpot, protection characteristic, fuzzy triangular comprehensive evaluation, fuzzy normal comprehensive evaluation.*

WRME047

On the Emission Rate From the Working Area of China Municipal Solid Waste Landfill

N.Qiang,ZH.Li, T.Liu

ABSTRACT

In order to study the odour emission rate of the urban solid waste landfill site in China, the emission rate of VOCs, H2S and odour units were measured by wind tunnel sampler. The results indicate that the emission rate of NPL is closely related to the environment temperature and the speed of surface sweeping. The emission rates of VOCs (measured as isobutylene by PID), H2S and odour units in summer are 380 ~ 680 μg • (m2 • s) -1, 4-7 μg • (m2 • s) -1, and 46.5-136 OU • (m2 • s) -1, in winter, the emission rates are 140-280 μg • (m2 • s) -1, 0.5-1.8 μg • (m2 • s) -1, and 8.5-16.2 OU • (m2 • s) -1, respectively. Compared with the cold season, the emission rate is almost 6 times that of the cold season. In the range of 0.6 ~ 4 m · s-1, the emission rate has a linear relation with the wind speed. The results of the continuous sweep test indicate that the emission rate measured by clean air sweep is the highest possible emission rate, which should be corrected in certain cases, for example when sampling times are longer than 10 minutes or when estimating surface emissions.

Keywords:*MSW landfill, nonpoint source, working area, odor emission rate, wind tunnel,*

ICED030

Spatiotemporal Variability of Mechanical Fields of Coal Floor under Mining Exploitation

J. Li, Z. Jiao, M. Zhang, and Z. Zhang

ABSTRACT

Using a comprehensive research method, the changing characteristics and spatial distribution law of the stress field in the bottom rock seam after coal mining were analyzed. The results show that at the early stage of working face mining, the maximum principal stress in front of the coal wall and near the cutting eye is approximately equal to the vertical stress, and propagates to the bottom rock layer in a spherical shape. The high shear stress propagated to the unmined coal seam bottom slope on both sides of the mining area and decayed rapidly, while the horizontal stress showed a weaker degree of concentration. As the working face continues to be mined, the maximum main stress field of the surrounding rock is sharply deflected. The bottom slab rock shows a main stress arch composed of high stress beams. The vertical stress peak line decays obliquely to the depth of the working face of the bottom rock layer according to the negative exponential law. Near the mine area, the vertical stress contour rises in an ear shape, and the bottom slab rock layer in the back of the workface mining area shows hysteresis stress and unloading pressure. The vertical stress contours eventually tend to be flat-bottom type, and the release range is saddle-shaped. The stress field of the coal seam floor has genetic correlation, and the decay rate of the stress field in the direction of the coal seam floor is much higher than that in the direction of the roof. The additional horizontal and shear stresses are highly concentrated in the shallow layer along the edge of the mining area, and then dissipate sharply. The combined effect of tensile, swelling and compressive stresses as well as the deflection of the mechanical field is the fundamental source of force for the movement of the bottom slab rock (bottom drum).

Keywords: *Coal seam floor, mechanical field, mining disturbance, spatiotemporal variation*

SECTION 8

Environmental Resource Management

WRME001

The Reclamation SuitabilityEvaluation of Damaged Mined Land Based on Distributive Product and Integrated Index Method

L. Cheng and H. Sun

ABSTRACT

The suitability assessment of reclaimed land is the foundation to decide the reuse orientation of the damaged land. Most of the research done by scholars has focused on improving and innovating evaluation models and methods, but there are few studies on limiting factors. In this paper, the suitability of the damaged land in the vicinity of Longchi Coal Mine is evaluated with integrated index method, and the restrictive factors are analyzed with the difference product method. Theresult shows damaged land around the Longchi coal mine is most suitable for being reclaimed as woodland. The extent of soil and water pollution and irrigation conditions are the main limiting factors. The study also verified that the combined Integrated Index and Differential Product Method are effective in assessing the suitability of reclamation and analysing limiting factors in the absence of significant assessment indicators.

Keywords: Reclamation suitability assessment, restriction factor analysis, damaged mining area, comprehensive index, differential product approach.

WRME004

Study on the Environment Effect and Production Efficiency of Modern Agricultural Demonstration Zone

S. Wu, Y. Zhang and P. Yang

ABSTRACT

Based on the three stage DEA model combining DEA and SFA, the paper analyses the productive efficiency of the country's modern development region, and gives the corresponding measures. In 2015, 51 modern agricultural demonstration zones were chosen for empirical research in Shandong Province. It is found that, with the effect of environmental and random error factors, the agricultural productivity efficiency has obviously changed, as well as the degree of urbanization, financial support and rural informatization. Compared with the results of the first and third DEA models, the average technology efficiency of the demonstration area was improved from 0.79 to 0.83, the average of SE was raised from 0.90 to 0.91, and the average SE rose from 0.88 to 0.90. The demonstration zones should combine their features and policies, rationally allocate the factors of agricultural production, raise the level of agricultural technology, promote the reform of production methods, optimize the environment for development and increase the efficiency of agricultural production in accordance with local conditions.

Keywords: Environment, Modern agricultural demonstration zone, Effectiveness of agricultural production, three-stageDEA.

WRME023

Molecules and Indoor Atmosphere Effect of Rosewood: *Dalbergia Cochinchinensis*

W. Peng, Y. Tan, Y. Zhou, C. Jie, N. Chang, L. Jun, Z. Liu and H. Ouyang

ABSTRACT

In this paper, we used PY-GC-MS, TDS-GC-MS and andGC-MS to study the health ingredients of Dalbergia cochinchinensis. The composition of known health functions in human body was investigated by reviewingavailable literature.2-Methoxy-4-vinylphenol has a potent anti-inflammatory effect, which is mediated by the activation ofNF-KB, MAPK, and histone acetylation, Apocynin is a naturally occurring methoxy-substituted catechol, which acts as an inhibitor of NADPHoxidase. It can decrease the production of oxide by activated neutrophils and macrophages, and has no effect on the phagocytosis.

Keywords: Dalbergia cochinchinensis, Py-gc-ms, Gc-ms, Tds-gc-ms, Health care ingredients.

WRME025

The Molecular Structure of Rosewood: Dalbergia fusca and its IndoorAtmosphere Effect

Li Y., Chen J., Chen X., Ni C., Lou J., Z. Liu, H. Ouyang and W. Peng

ABSTRACT

In this paper, the organic solvent extracts of Dalbergia fusca TG, Py-GC-MS, TDS-GC-MSP, FT-IR, GC-MSanalysis were studied. Subsequently, the pyrolysis products were analysed byGC-MS. It was found that there were a lot of bioactive components in the extract of Dalbergia fusca, including alkanes, phenols, alcohols, ether and acids. The major components of Dalbergia fusca are healthy and plentiful extracts of Dalbergia fusca, the major active ingredients are alpha.-Bisabolol, vanillin, nonanal, homovanillic acid, methylparaben, phthalic anhydride, benzoic acid, octadecanoic acid, benzoic acid, 4-hydroxy-and n-hexadecanoic acid. Not only in bio-energy, bio-medicine, cosmetics, skin care and spices, but also in other areas, Albergia fusca Pierre's chemistry provides the scientific basis for developing and using the plant.

Keywords: *Dalbergia fusca*, chemical composition, Py-GC-MS, GC-MS, TDS-GC-MS.

ICED025

Influential Factors of Major Forest Chemical Products Export in China

L. Huang, T. Luo, M. Zhou

ABSTRACT

The most important non-timber forest products (NWFPs) in the world. The use of these products continues to grow in the context of global economic integration, and as a result, worldwide demand for these products is growing every year. China is the world's largest exporter of forest chemicals, and such exports are growing fast. Based on the revised Constant Market Share (CMS) model, this paper analyses the changes, causes, and internal mechanisms of China's major forest chemicals exports in 1992-2011. The analysis indicates that these exports are growing rapidly, mainly due to growing demand from the international market and the improvement of the products' competitiveness. Further, the market distribution of Chinese forest chemical products in the main sample of the search is shown to be continuously improving, that is, the export target market structure of the product is continuously optimizing. Moreover, Japan was the biggest importer of the main Chinese forest chemicals during the analysis period, but its competitiveness on the Japanese market has declined substantially over the last few years.

Keywords: *Forest chemical product, Modified CMS model, Export, Influencing factor, NWFP.*

WRME030

The Molecular Characteristics of Rosewood: Dalbergia granadillo and Its Indoor Atmosphere Effect

JT.Chen, CY.Ni, SB.Ge, JW.Lou, ZL.Liu, H.Ouyang, WX.Peng

ABSTRACT

The health ingredients of Dalbergia granadillo were studied with PY-GC-MS, TDS-GC-MS and GC-MS. The composition of known health functions in human body was investigated through a review of available literature. 7-Methyl-Z-tetradecen-1-ol acetate has the function of eliminating heat and relieving cough, as well as effective treatment of fire-induced dry cough and sore throat. 1,2-Benzenedicarboxylic acid, bis (2-methylpropyl) ester has certain anti-cancer activity, and can be applied to the synthesis of anticancer drugs.

Keywords:*Dalbergia granadillo, GC-MS, GC, GC-MS, TDS-GC-MS, Healthcare components*

WRME040

The Spatial Evolution and Simulation of Foshan Based on Spatial Analysis Methods for Urncl

HB.Xiao, S.Sheng, Y.Cui

ABSTRACT

The concept of Rural Non-construction Land (URNCL) is a kind of spatial solution to the problem of resource and environment, as well as the need for sustainable development in fast urban areas. Based on RS and GIS space analysis and its mathematical model, this paper takes Foshan, Pearl River Delta. In this paper, the spatial evolution features of non-construction land in Foshan are described in terms of quantity structure, rate of change, spatial differentiation, spatial pattern and spatial pattern. In 2008, the size of URNCL in Foshan decreased 985.67 km ² compared to 1990, and decreased 28.18%. After decreasing, the dynamic degree of the integrated land use patterns in Foshan was increasing, and the biggest one was 1990 ~ 1995, reaching 2.36%. Based on the CA model, it is estimated that Foshan City will have an area of 1515.23 square kilometers in 2020, which is much larger than the planning control. It is necessary to construct a set of reasonable technology and management measures of URNCL, so as to deal with the disorderly spread of construction land.

Keywords: *Urban and Rural Non-construction Land, Space Evolution, Space Analysis, Foshan City*

WRME042

The Application of Improved Cuckoo Search for Reservoir Power Generation Optimized Operation in Cascade

WL.Yuan, MQ.Liu,F. Wan, FQ.Wang

ABSTRACT

There are some shortcomings in the original cuckoo search with Lévy's flight for random walks, such as unstable solution and trapping in the local optimum solution. In this paper, we use cuckoo search to optimize the power generation of cascade reservoir by means of a new neighbor sequence algorithm and a variable neighborhood descent local search, so as to improve the performance. It is shown by a case study that the hybrid algorithm is reasonable and reliable when it is applied to the optimal operation of the cascade reservoir. It has been shown that the improved Cuckoo Search is more efficient in both the search efficiency and the stability of the optimal solution.

Keywords: *Cascade Reservoir, Power Generation Optimum Operation, Cuckoo Search, New Neighbor Sequence Algorithm, Variable Neighborhood Descent*

WRME043

Shenyang City'S Three-Dimensional

TF.Chen,K.Chen,C.Wang

ABSTRACT

Based on 3D (3D) ecological footprint model, the dynamic variation of 3D ecological footprint in Shenyang from 2005 to 2016 was measured, and the driving factors of 3D ecological footprint were analyzed by PD. The results show that: the total 3-D EF of Shenyang City is rising from 2005 to 2016, with an average annual increase of 16.5%. The results show that the ecological footprint of Shenyang is increasing year by year, while the exchange and trade, environment management and land use structure are beneficial to reduce the pressure of ecological expansion. Analysis of the significance of variable forecast shows that the GDP per capita and MSW have more effect on the EF, and they are in agreement with the results of regression analysis. In the future, it is necessary to improve the efficiency of city ecology by optimizing industry structure, utilizing clean energy, actively developing foreign trade and communication, and making rational use of city land.

Keywords: *Shenyang City, 3D Ecological Footprint, Footprint Depth, Footprint Width, Partial Least Squares,*

ICED068

The Variation of Methane Concentrations in Southern Qinshui Basin Coalbed Methane Enrichment Region China

He, S. Peng, W. Du, G. Zou, S. Shi

ABSTRACT

The ununiformity of coal-bed methane accumulation has always been a problem for exploration and exploitation. There is a big difference in the concentration of methane even among different wells in a region. In order to study the main factors and causes of these variations, we chose a relatively mature development block in the Southern Qinshuibasin, China. Based on individual well data, 3D seismic data and methane data, and taking CBM (CBM) as a closed system, we analyzed the enrichment irregularity of CBM in CBM 3 # and the geological factors affecting the enrichment. The results indicate that the formation of CBM is caused by the interaction of different geological factors. The enrichment is controlled by several factors, such as tectonic development, formation pressure, coal-bed structure, roof layer properties, and hydrogeologic conditions. Among these, formation pressure and coalbed structure are the most likely factory-cause differences in methane contents. The buried depth influences the formation pressure, which in turn influences the saturation of the CBM. Moreover, the coal-bed structure decides the development of the reservoir space.A larger reservoir space and a higherbed pressure are more favorable to the enrichment of CBM, and the optimum concentration area is found in the synclinal region. Moreover, the structure of the CBM is controlled by the structural development, the development of the fault reduces the methane, and the mud cap provides the trap for the accumulation of CBM.

Keywords: *Southern Qinshui Basin, Coalbed Methane (CBM), Enrichment Region, Methane Content*

WRME032

The Effects of Water Drinking in Outdoor Hot Environments on Physiological Responses

GZ.Zheng, ZH.Li, YJ.Wang, WT.Bu, B.Wei

ABSTRACT

Under the hot and scorching sun conditions, sanitation workers, traffic policemen and other outdoor workers remain committed to their work. The high temperature outside in summer poses a great threat to the health and safety of outdoor workers. This article chooses the traffic police and the sanitation workers as research subjects. The participants were asked to perform various tasks, such as walking and stepping on stairs, to simulate the work of the traffic police and the sanitation workers. Heart rate, rectum temperature, skin temperature, body weight, grip strength and heat sensation were measured. It was found that active drinking and passive drinking had a good influence on HR and SR. Moreover, passive drinking can decrease the PSI and heat storage. Research has also found that the rate of perspiration affects the temperature of the body. The results of this research will help us to know more about the influence of drinking water on the physiological reaction, which will be helpful for the protection of the workers' occupational health.

Keywords: *high temperature, physiological reaction, drinking water, heat sensation.*

ICED032

Impact of the EU and US Timber Act on China's Export of Forest Products

F. Hou

ABSTRACT

With the increasing deterioration of ecological environment, the issue of harmonious development of trade and environment has been widely concerned. Today, some developed countries have passed bills to ban illegal timber, such as the EU Timber Regulation and the Lacey Act in the US. These acts require not only that wood be imported from legal and sustainable sources, but also that wood used for forest products be traceable to legal sources. China is an important importer and exporter of forest products. The above bills will have an inevitable and significant impact on companies producing forest products. This paper examines the effects of the implementation of these bills and provides an empirical analysis of the impact of the EU Timber Regulation and the US Lacey Act on China's forest products exports. It is concluded that development will promote China's forest products exports, while forest resources and RMB appreciation will inhibit exports. In addition, the implementation of these acts has inhibited the export of Chinese forest products.

Keywords: *Export of forest product, timber regulation, lacey act.*

ICED026

Symbiotic Relationship of an Entrepreneurial Ecosystem

Y. Ding, X. Song

ABSTRACT

Through a review of theories and papers on entrepreneurial ecosystems at home and abroad, the concept, composition and characteristics of entrepreneurial ecosystems are analyzed, and the specialization and diversity of resources among entrepreneurs of entrepreneurial subjects are proposed as the basis for the establishment of symbiotic relationships. Based on the analysis of the drivers of symbiotic relationships in entrepreneurial ecosystems, a model of symbiotic relationships in entrepreneurial ecosystems is constructed, which consists of three stages of identification, formation and development of symbiotic relationships. The results of a study show that entrepreneurial enterprises in the entrepreneurial ecosystem, driven by the needs of the enterprise and combined with external environmental factors, explore entrepreneurial opportunities with other entrepreneurial enterprises by integrating their own needs, establish symbiotic relationships among entrepreneurs, promote symbiosis, and strive to further develop the entrepreneurial ecosystem.

Keywords: *Entrepreneurial ecosystem, symbiotic relationship, business startup*

ICED044

Reflections on the Implementation of Energy Internet - Energy Production and Coordination Optimization

Y. Zhu, and J. Li

ABSTRACT

The Energy Internet is currently the focus of academic and industrial attention as a possible future sustainable energy solution. This paper first briefly introduces the current development status of the energy Internet. Next, the concept and architecture of the energy Internet are described, and the basic features and hierarchy of the energy Internet are summarized. Then the frontier research on energy production and coordination optimization during the implementation of energy Internet is summarized. Finally, the implementation of the energy Internet is analyzed and discussed.

Keywords: *Energy Internet, distributed generation, energy production, coordination optimization.*

ICED045

A View on Opportunities and Challenges in Energy Internet

Y. Zhu and J. Li

ABSTRACT

Energy is the basis for the survival and development of modern society. The integration of information and communication technology and energy technology provides possible solutions to achieve sustainable energy development, and the energy Internet has attracted the attention of many scholars and gradually become a hot spot and trend of research. This paper first introduces the concept and background of energy Internet implementation. Secondly, it summarizes the business model and realized value of the energy Internet. Finally, the changes as well as opportunities and challenges brought by the energy Internet are analyzed and discussed in detail.

Keywords: *Energy Internet, business model, value realization, opportunity and challenge, business model.*

On the Assessment of Management Level in Water Resources

Mostafa Naderi

ABSTRACT

Unsustainability in water resources is referred for depleted groundwater storage and reduced river flow in the literature. Lack of a clearly defined path and specificity of a concept in literature to quantify the level of water resources management, applicable for different spatio-temporal scales, under supported environmental flow requirement are main criticisms for sustainable water resources management. Thus, this study aims to present a physical metric, based on water availability and supply concepts, to overcome mentioned challenges. It quantifies the level of management (either for surface or ground water) using the ratio of residual volume of available water (available water minus water supply) to initial available water in a given area. Management of nine rivers and Fumanat aquifer in Gilan Province of northern Iran (adopting as a case study) is quantified for the baseline period (1989–2012) and future (2020–2050) climate change scenarios under alternatives of available and improved water use efficiencies. The Soil and Water Assessment Tool is used to simulate river flow under three climate change scenarios. Climate change study under three Shared Socio-economic Pathways (SSP1-1.9, SSP2-4.5, SSP5-8.5) indicates that temperature (precipitation) will increase (decrease) by 1.4–2.1 (2.9%–12.31%), resulting in reduced available water in river and aquifer in the future. Observed annual management in rivers (groundwater) is −1.278 to 1 (−0.07) and −0.772 to 1 (0.104) under available and improved water use efficiencies, respectively. Climate change, however, will reduce the level of management over the study area in which the reduction is higher for a greater level of warming. Efficiency improvement increases management level; however, three rivers and groundwater will still suffer from mismanagement in the future.

Keywords: *Level of management, water availability, water supply, river, groundwater*

SECTION 9

Environmental Chemistry and Engineering

WRME002

Organic Carbon Content and Humus Composition After Application of Aluminum Sulfate and Rice in Salt Alkaline Soil

X. Zhao, M. Zhu, X. Guo, H. Wang, B. Sui and L. Zhao

ABSTRACT

In this paper, the organic carbon accumulation in soda-alkaline soil was studied, and the influence of the humidity-component on the soil with aluminium sulfate and rice straw was studied. Using different amounts of rice straw and aluminium sulfides, the improvement effect, the organic carbon content and the humus content were studied, and the content of the organic carbon and the humus were analyzed by using the Potassium dichromate oxidation titration (external heat) and Kumada method. In this paper, the transformation of soil organic matter in saline and alkaline soil during the process of improving is clarified. The results showed that the content of soil organic carbon increased obviously (13% — 92%) with different dosage of rice straw and aluminium sulphate. With the addition of different amount of rice straw, the contents of freefraction and the combined fraction of humus and its composition (humic acid and fulvic acid) were increased. Free fraction of humus increased more dramatically. The free fraction of humus and humic acid (HA) was partly converted into combined fraction because of aluminium sulphate. The free HA was changed to P type when the rice straw was applied. The free form of HA was changed from P to Rp with aluminium sulfides. In the case of rice strain, the combined HA was transferred only in type A. The addition of Luminum sulphate did not significantly affect the combination of HA. The content of SOC in soil was increased when the amount of Al sulfidation was increased. Application of rice straw or aluminium sulphate could decrease the moisture content of HA. Based on the type of HA, it can be concluded that the humus has become younger and more vigorous as a result of the use of rice straw and aluminium sulphate.

Keywords: Luminum sulfate/ricestraw, Saline-Alkali soil, Organic carbon in soil, Humus.

WRME006

Study on the HeavyMetal Removal of Parabolic Hydrocyclone with Dredging Slurry

X. Yang, P. Liu, Y. Zhang and L. Jiang

ABSTRACT

Heavy metals accumulate in the fine particles of the slurry and must be removed or reduced prior to its recycling. But the separation by conventional hydrocyclones usually results in low separation efficiency, since the fine particles cannot be separated completely. Therefore, a new type of hydrocyclone for removing heavy metals from dredging sludges was proposed in this paper. Computational F luid D ynamics (CFD) combined with the Mixture and Reynolds Stress Model (RSM) were used to simulate the inner flow field of a parabolic hydrocyclone, which was subsequently validated by an experimental test-.simulation results indicate that the t he flow field in the parabolic hydrocyclone is more stable than the conventional hydrocyclone. Additional experimental results show that the cumulative proportion of fine particles in the downstream product decreases significantly, T he cut size increases from 30 μm to 49 μm, and the steepness index from 0.13 to 0.2, which shows that the separation precision can be improved, and the fine particles mixed in the underflow can be reduced. Furthermore, the content of Zn and Cr was 97.21%, 78.27%, which proved that the enrichment was effective. Consequently, the downstream products, following the parabolic separation of the hydrocyclones, contain less metal and are not hazardous or recyclable.

Keywords: Heavy metal, Parabolic hydrocyclones, CFD, Separation efficiency.

WRME009

Component Characteristics of Air-improving Phytoncides Released from *Phoebe bournei* Plantation

L. Liu, X. Cheng, J. Ma, W. Chen, Y. Wang, X. Dong, S. Wen, D. Zhang and G. He

ABSTRACT

Phoebe bournei is listed as a national class 2 protected plant in China. In this study, the volatile compounds and their variation in the four tissue parts of the leaves, branches, stems, and roots of P. bournei (Hemsl.) were studied. (PBY) for the first time, and the effect of these phytoncide compounds on the ecological environment and the forest health benefits were analysed systematically. Most of the volatile compounds found in all the PBY outcrops were sesquiterpenes and sesquiterpenes, while the total content of sesquiterpenes in the leaves and branches was higher than those in the leaves and the roots. The most volatile compounds in the leaves were isolepidozene (16. 62%, 6 years), followed by β-cubebene, γ-sitosterol and α-copaene. The most volatile compounds were α-copaene (18.476%, 14 years), followed by caryophyllene, δ-cadinene, and γ-sitosterol. The main compounds in the trunk were the same as those in the roots, with the highest content of Guajol (the highest at 21. 26%, 3 years old, the highest was 30.68%, the root was 6 years old), and Agarospirol (the highest was 25.22%, 55 years old, the highest was 23.78%, the root was 55 years old), andjinkoheremol (the highest was 21.37%, 55 years old, 20.22%, 55 years old). As bait for the beetles of Xyleborus glabratus Eichhoffand Euwallacea fornicatus Eichhoff, the compounds α-cubebenea and α-copaene may be used to facilitate ecological afforestation by reducing the damage caused by those pests to Lauraceae, such as laurel. Guajol from PBYhas anti-tumour activity, and agarospirol and jinkoheremol have anti-inflammatory and immune regulation. Such beneficial compounds may also contribute to a reduction in the use of non-biological agents such as antioxidants, thereby contributing to a beneficial effect on human health. The results show that the plantation of P. Bournei will have a significant impact on forestry through the release of a number of phytoncides.

Key words: Phoebebournei, improvement of air quality, efficacy of forest medicinal products, phytoncide.

WRME013

Analysis of the Active Components of Loropetalumchinense Var.rubrum

C. Sun, J. Zhang K. Li, C. Shi and Z. Zhang

ABSTRACT

The effective components were extracted from the plant Loropetalumchinense var. Rubrum by rotary steaming. The mixture was ground into powder, dissolved in 1: 1 ethanol, ethanol and methanol, 1: 1 ethanol and 1: 1 ethylacetate. TDS, Fourier IR, TG, TG and thermaldesorption GC were developed. Cellulose, hemicellulose and lignin increase the thermal degradation reaction with increasing temperature and time, resulting in lots of extraction.

Keywords: Loropetalum chinense var. Rubrum, • GC-MS, TG, FTIR.

WRME015

Molecules and Indoor Atmosphere Effect of Rosewood: *Dalbergia latifolia*

Z. Hu, N.C., S. Jiang, J. Chen, S. Ge and W. Peng

ABSTRACT

Dalbergialatifolia Roxb (DLR) is a tree species valued for wood in India and Java, Indonesia. It is a species of rosewood, and its widespread use in furniture and construction has led to extensive logging and a substantial decrease in theDLR stock. Our objective is to determine the chemical composition of theDLR Heartwood and to assess its uses and functions in order to determine its application. In this study, five methods were used for the detection and analysis of chemical constituents, including Thermogravimetric (TG), Fourier Transforminfrared (FT-IR), GC-MS (GC), pyrolysis gas chromatography-mass spectrometry (Py-GC-MS) and thermaldesorptions (TD-GC-MS). Besides cellulose, hemicellulose, and lignin, the main chemical compounds are phenols, alcohols, acids, and ethers. The main chemical compound is the isobutyl phthalate, elemicin, β-eudesmol, 2,6-dimethoxy-4-allylphenol, catechol, guaiacol, hydroxyacetone, formononetin, and 7-hydroxy-3- (4-methoxyphenyl) -2H-chromen-2-one.

Keywords: *Dalbergia latifolia*, Chemical composition, FT-IR, Py-GC-MS, TD-GC-MS.

WRME017

Pyrolysis-based ResourceUtilization of Benzene/Ethanol Extraction for Rapeseed Cake Treated

W. Zhao, X. Zhang, B. Zhou, J. Ma, L. Liu, X. Cheng, H. Zhang, D. Zhang and W. Peng

ABSTRACT

Rapeseed oil is the world's second-largest vegetable oil, and its by-products (rapeseed) produce over 10 million tonnes annually, but its processing and use are still low, leading to a waste of resources and pollution of the environment. This study was designed to explore the new method of utilization of rapeseed cake, and to prepare the extract and extract from rape cake. This was done by using modern analytical methods, the chemical composition of the thermal cracking products and the analysis of the pyrolysis rules of the extraction and extraction processes. Infrared analysis showed that: (1) There were alcohols, phenols, ketones, hydrocarbons, ethers, amides, amines in the samples of Ofrapeseed cake. (2) The substances in the extract and the extraction residue are ketone ether, ethyl phenols, hydrocarbons, carboxylic acids, and amides. (3) There are new compounds, such as carboxylic acids, in the benzol/ethanolextract of rapeseed cake, and new compounds, such as heterocycles, aldehydes, nitriles, etc., are found in the residue of rapeseed cake. Composition analysis has revealed a number of new chemical substances in the pyrolysis products of rapeseed extract and extract residues, for example, 3,5-dimethoxyacetophenone may be used as an intermediate in the production process, oleic acid ethyl ester can be used as lubricant, water repellent, resin toughening agent, surface active agent, medicine, preparation of plasticizer and cream base, etc., and is also used as spice. There are many useful chemical ingredients that have a very broad prospect.

Keywords: rape cake, extract, extraction residue, pyrolysis GC/MS.

WRME018

Chemical Constituents of Vitex Negundo Wood

H. Li, X. Zhang, J. Li, C. Shi and Z. Zhang

ABSTRACT

In this paper, Vitex negundo wood flour with different extraction materials is heated at room temperature by thermogravimetry. Finally, TG curved.The properties of the Vitex negundo Wood Gas Chromatography/Mass Spectrometry (GC-MS) analysis of the chemical components of Vitex negundo Wood, to examine the presence of high levels of sugar, oleic, oleic, phenol and formaldehyde in food, pharmaceuticals, industry and in the near future. It was found that when the volatile compounds of vitex negundo wood were analyzed by thermal decomposition GC/MS (TD-GC-MS), there were a lot of intermediate products.

Keywords: Vitexnegundo wood, TG, GC-MS, FTIR, TD-GC-MS.

WRME021

Nanomaterials as "nanoreactors" for increasing the electrochemical capacity of polyaniline/graphene oxide composites for supercapacitors

X. Chen, Y.Yu,W. Peng, L. XuN and G. Liu

ABSTRACT

The aniline was introduced into the mesoporous pores of the silicon dioxide, and then the metaphase (mSiO2) was dispersed among the sheets of graphene, and the mesoporous material was synthesized as "nano reactor" forpolyaniline (PANI). The morphology, composition and microstructure of PANI were investigated by SEM, FT-IR and X ray diffraction (XRD). The results indicated that PANI nanofibers were embedded in the mesoporous silica, and the mSiO2 was uniformly intercalated between them. This unique structure gives the GO/mSiO2/PANI composite composite a high capacity of 1218.4 F/g at a current load of 0.5A/g, which shows its potential application as electrode material for supercapacitors.

Keywords: Mesoporoussilica, Graphene Oxide, Polyaniline, Supercapacitor.

WRME059

Determination of Polycyclic Aromatic Hydrocarbons in Water by Quantum Dots Extraction Coupled with High-Performance Liquid Chromatography for

X. Yang, N. Luo, Y. Zong, Z. Jia, and X. Liao

ABSTRACT

A new alternative method for extracting and pre-concentrating polycyclic aromatic hydrocarbons (PAHs) from water samples is proposed. This new method exploits the affinity of str ng between PAHs and NAC-CdS QDs modified by N-acetyl-L-cysteine. The NAC-CdS QDswere synthesized in our lab. NAC-CdS QDs were used for preconcentration of 12 PAHs in tap water samples prior to high performance liquid chromatography (HPLC-FLD). The test results indicate that the LOD (LODs) for PAHs are between 1.0 and 100 ng/l, with a RSD between 0.4 and 2.8%, and the recovery is between 74.3 and 95.9%. With this new pre-treatment, the whole extraction process requires only 1 ml of organic solvents per sample, so it is environmentally sound and cost-effective.

Keywords: *Reconcentration, polycyclic aromatic hydrocarbons, NAC-CdS quantum dots, HPLC-FLD.*

WRME060

Cloud Point Extraction Coupled with Ultraviolet-Visible Spectroscopy for Determination of Trace Zinc in Environment and Rabbit Blood

X. Yang, Z. Jia, X. Yang, N. Luo, and X. Liao

ABSTRACT

In this paper, an improved pre-concentration method called Cloud Point Extraction (CPE) with UV – Visible Spectrum (UV-vis) has been developed. Based on the complex reaction between Zn (II) ions and 1- (2-pyridylazo) -2-naphthol (PAN), non-ionic surfactant-Triton X-100 was adopted. Sodium dodecyl sulfate (SDS) and NaCl electrolyte solution were used to reduce the CPT temperature in Triton X-100to 0 ℃. Determination of the enriched analytes in the surface rich phase was carried out at 549 nm by spectrophotometric method. Factors related to CPE were evaluated and optimized, such as Triton X-100, SDS concentration, chelate concentration, pH and salt. The proposed CPE-UV-vis method demonstrated a linear calibration in the range of 10 to 1000 ng · ml-1 for Zn (II) under optimal conditions, and the limit of the assay was 3.3 ng · ml-1 at pre-concentration factor 38. The RSD is 2.8% (CZn (II) = 100ng · ml-1, n = 11). With satisfactory results of analysis, the proposed method could be used for the determination of trace amounts of zinc in actual and certified samples.

Keywords: *Cloud point extraction, ultraviolet–visible spectroscopy, zinc.*

ICED021

T Power Electronics Based on MMC Architecture

Y. Tang, M. Wang, H. HAO, X. Zhao

ABSTRACT

First of all, the topology of power electronics transformer based on MMC is researched. Furthermore, a new topology is proposed, which combines the power electronic transformer and the energy storage system. Then, this paper introduces the control strategy of the power electronics transformer. In the end, a simulation model of power electronics transformer based on MMC is established under PSCAD simulation. Simulation results show that the power electronic transformer can keep the voltage and current waveform in sine wave, and can withstand load disturbance, isolation failure and isolation. Furthermore, we also do some research on the battery model under the PSCAD simulation environment, and then analyze the effect of battery storage on load. The power electronic transformer topology based on the energy-storage system can ensure the quality and reliability of the power supply.

Keywords: *Power electronic transformer, MMC, Energy storage system, Topology, Simulation analysis.*

WRME061

Prediction of Dissolved Oxygen and Biochemical oxygen Demand by Using

S. Wang, R. Li

One-Dimensional BOD-DO model

ABSTRACT

As measure of water quality, the concentration of DO always gets much attention. The chemical reactions in water bodies are mainly related to DO, so the concentration of DO is closely related to water quality. The Biochemical oxygen Demand and Dissolved Oxygen Model (BOD-DO) is used to demonstrate the relationship between BOD and DO concentrations and their physical characteristics. It is difficult to determine the analytic solution for this model, so we use Chebyshev orthogonal polynomial to solve the model numerically. Then, the four-order differential of oxygen deficit was expressed by Chebyshev orthogonal polynomial with coefficient coefficients. Finally, a simulation experiment was carried out to validate the rationality of the model. The real BOD and oxygen deficit were calculated with the original model. Using real values and equations, it was possible to solve the coefficients and calculate the predicted values. A comparison was made between the predicted values of BOD and DO concentrations. Five statistical measures were used to evaluate the forecast results.

Keywords: *Water quality, dissolved oxygen forecasting, numerical solution, biochemical oxygen demand forecasting.*

WRME065

Impact Assessment of Industrial Energy Consumption Based on Input Output Complex Network

R. Zhou, X. Wang

ABSTRACT

Target control and industry transfer are important means of regulating energy conservation and reducing emissions in a region, so measuring the impact of each industry on energy consumption is essential for adjusting regional industrial structure. Industrial complex networks theory is used to construct a model of energy flow based on input-output relationships, representing the input and consumption of materials and energy between industries, assessing the impact of the energy sector on the economy, and looking for ways to save energy and reduce emissions at industry level. Through the measurement of the impact of various industries on the energy consumption of Shandong Province, the following strategies are proposed: Research and development of new technologies, Sorting management with emphasis on controlling "key industries", and focusing on those sectors which consume less energy but are more closely related to other sectors, Rational layout of industry, optimize industry structure.

Keywords: *Energy consumption, energy flow network, Shandong province, evaluation of industrial impact.*

WRME030

The Molecular Characteristics of Rosewood: Dalbergia granadillo and Its Indoor Atmosphere Effect

JT.Chen, CY.Ni, SB.Ge, JW.Lou, ZL.Liu, H.Ouyang, WX.Peng

ABSTRACT

The health ingredients of Dalbergia granadillo were studied with PY-GC-MS, TDS-GC-MS and GC-MS. The composition of known health functions in human body was investigated through a review of available literature. 7-Methyl-Z-tetradecen-1-ol acetate has the function of eliminating heat and relieving cough, as well as effective treatment of fire-induced dry cough and sore throat. 1,2-Benzenedicarboxylic acid, bis (2-methylpropyl) ester has certain anti-cancer activity, and can be applied to the synthesis of anticancer drugs.

Keywords: *Dalbergia granadillo, GC-MS, GC, GC-MS, TDS-GC-MS, Healthcare components*

WRME026

Study on the Molecular Characteristics of Rosewood: Cassia siamea and Its Indoor Atmosphere Effect

JT.Chen，CY.Ni，JW.Lou，ZL.Liu，H.Ouyang，WX.Peng

ABSTRACT

In this paper, we used PY-GC-MS, TDS-GC-MS, and GC-MS to study the health ingredients of Cassia siamea. Based on the literature, the components of the known health functions of human beings were investigated. Among them, 1,2-benzenedicarboxylic acid and bis (2-methylpropyl) ester have some anti-cancer activity, and they can be used to synthesize cancer drugs. Phenol, 4-ethyl-2-methoxy-, can protect neurons against excitotoxicity by inhibiting the N-methyl-D-aspartate channel composed of NR1/NR2B.

Keywords: *Cassia siamea, GC-MS, GC, GC-MS, FT-IR, Healthcare components.*

WRME027

Molecular Study on Red Sandalwood: Dalbergia Retusa and Its Indoor Atmosphere Effect

LS.Wang，JT.Chen, CY.Ni, JW.Lou, ZL.Liu, YY.Zhou, YM.Tan, WX.Peng

ABSTRACT

In this paper, PY-GC-MS, TDS-GC-MS and GC-MS were used to study the human health components of Dalbergia retusa. Based on the literature, the components of the known health functions of human beings were investigated. The brain cells of 2-methyl-9-(prop-1-en-3-ol-2-yl) - can protect and enhance function, improve brain memory and eliminate fatigue, 1,2-Benzenedicarboxylic acid, bis (2-methylpropyl) ester have some anti-cancer activity, and can be used in the synthesis of cancer drugs. Benzenedicarboxylic acid, 1,2,3-trimethoxy-5- (2-propenyl) -oxidation action, it has anti-inflammation and anti-thrombus action, besides hyperlipemia, it also has the function of reducing blood pressure.

Keywords: *Dalbergia retusa, GC-MS, GC, GC-MS, TDS-GC-MS, Healthcare components,*

WRME028

The Potential of PVC/Wood Flour Composites of Decayed Wood

SB.Ge, SC.Jiang, JJ.Ma, WX.Peng, ZF.Zhang,

ABSTRACT

Although there is an increasing use of wood and plastic composites (WPC), WPC has so far mostly been made from healthy wood, which has always been burned and thrown away, resulting in a great waste of resources and pollution of the environment. But the decayed wood have high content of lignin, and can be used in polymeric materials. In this paper, the decayed wood plastic composites (DWPC) were manufactured by using NCC, AC and Chitosan (CS) as well as sound wood plastics composite (SWPC). Comparing the physical and chemical properties of the DPWCs and SWPCs, it was found that the mechanical, chemical, thermal stability, Cr and flame retardancy of DWPC with CS were superior to that of DWPC. Rotten wood flour and PVC (approximately 30% and 70%) mixed with CS (4%) can improve the physical, chemical and adhesive properties of DWPC, and achieve sound wood plastic composites. This work proposes a new green strategy, and demonstrates the potential of PVC/wood flour composites with decayed wood.

Keywords:*WPC, calcium carbonate, active carbon, chitosan, physical and chemical properties*

WRME077

Jacking Force Calculation Methods for Continuous Rigid-frame Bridge with High-Temperature Closure

F. Yu

ABSTRACT

Aiming at the situation that when the actual closing temperature of the continuous rigid frame bridge is higher than the designed closing temperature, the closing temperature difference will result in the horizontal displacement on the top of the structure, so that a horizontal lifting force can be used to eliminate the negative effect of the closing temperature difference. This paper offers two calculation methods for jacking forces: 1) a method of eliminating the horizontal displacement of the pier top, 2) a method of eliminating the tensile forces in the main beam. Based on the above two methods, the vertical lifting force of Longtan River Extra-large Bridge is calculated. By analyzing and comparing, the results of the two methods are basically in agreement. It's shown that the two calculation methods are practicable, and the method of eliminating the tension in the maingirders is easier and faster.

Keywords: *Continuous rigid-frame bridge, closure temperature difference, jacking force, pier top's horizontal displacement.*

WRME045

Wet Deposition Cfd Model Based Research of Large Scale Natural Draft Cooling Tower

X.Wang,WJ.Bao,XD.Huang,X.Wang,FL.Du,DZ.Wang,B.Wang

ABSTRACT

The traditional study of the Natural Draft Cooling Tower of Nuclear Power Plant is based on the Gauss Diffusion Model or Wind Tunnel Experiment. With the development of the Main Computer and the Turbulence Model, it is possible to simulate the plume drift with CFD. Because of its strong computation capability, CFD can accurately simulate and show plume drift. In this paper, the data of the 1977 Chalk Point Dye Tracer Experiment are used to simulate the CFD, and the Taohuajiang and Pengze Nuclear Power Station are also given. Conclusion: The results of CFD are in good agreement with ChalkPoint experiment, and compared with the SACTI model, the CFD results in the near area are bigger than the SACTI model, and the SACTI results decrease more quickly than the CFD. In this paper, CFD is a powerful tool for environmental impact assessment without other on-site data.

Keywords: *computational fluid dynamics, cooling tower, wet deposition, nuclear power plant*

WRME046

Traditional Study of Natural Draft The Study on The Role of Changing Geochemical Forms in Repairing Heavy Metal by Biological Iron Sulfide Composites

YJ.Liang,SH.Lan,X.Xia,XD.Li,PH Yan,YS.Wang,W.Yuan,YF.Xie

ABSTRACT

In this paper, the growth of bioferric sulfide composite materials and its effect on the change of geochemical forms of copper in sediment have been studied. The role of bacteria in removing copper from copper was determined by the method of three sequential extraction. Moreover, the diversity of bacterial community was examined among different treatments. Copper was converted from weak acid extraction to reduced and oxidized state in the presence of bioferric sulphide composite. The conversion ratio of Cu from weak acid to other states reached 76.66%, and that of reducing state increased to 177.85%. Higher dissolved oxygen do harm to the sulfate reducing bacteria, which leads to the low removal efficiency of copper. Therefore, it can be concluded that the difference in the structure of the bacterial community leads to the difference in the conversion rate and the biological efficiency by the correlation of the concentration of Cu and the alpha diversity. Moreover, the analysis of bacterial 16S rRNA showed that the Proteobacteria were the most efficient. The bioferric sulfide composite can improve the removal efficiency of copper by enhancing the activity of sulfate reductant in the sediment.

Keywords: *Sulfide-Reducing bacteria, Cu, Geochemical Form, BCR, Bacterial community.*

ICED062

Systemforan Officein Hotand Humid Climates Performance Evaluation of a Radiant Heating/Cooling

W. CAI

ABSTRACT

In this paper, a numerical study was conducted on the thermal comfort of radiation heating/cooling (RHC) system in hot and humid climates. Based on Computational Fluid Dynamics (CFD), a mathematical model is developed to estimate the airflow and temperature distribution in an office that has been heated by a Radiant Floor Heating System (RFH) and cooled by a Cooling Ceiling Integrated with Displacement Ventilation (CC/DV). Numerical simulation of the influence of outside windows on RFH system was conducted, and the comparison of CC/DV, DV and conventional air conditioning was conducted. The CFD simulation indicates that there is a strong circulation in an office with RFH system, and the average air temperature is about 1.8 K. The RFH system leads to a uniform temperature and a good vertical temperature gradient. The results show that the CC/DV system in hot and humid climates is more comfortable than the cooling wall and convection terminal because of the lower vertical temperature gradient, and the horizontal temperature gradient is less than 1.2 K. Thus, the system is able to provide a satisfactory cooling of fresh air and reduce the risk of condensation on the cold ceiling surface in hot and humid weather.

Keywords: *radiant heating and cooling, thermal comfort, CFD, ventilation*

ICED029

A Wireless Bidirectional Power Supply Topology Suitable for Vehicle-to-grid Technology

X. Jiang, C. He, and Z. Zhu

ABSTRACT

Vehicle-to-grid (V2G) technology facilitates bidirectional energy exchange between electric vehicle batteries and an electric power grid. This is an important component of smart grid technology, which not only can alleviate the problem of power grid fluctuations owing to the use of intermittent energy sources like wind and solar power, but also can benefit users of electric vehicles. In recent years, the development of wireless power transmission has provided a new route for electric vehicle charging and discharging. The absence of physical contact offers numerous advantages such as flexible mobility and safety, and is therefore more suitable for application to V2G technology. This paper proposes a bidirectional wireless energy transmission topology appropriate for V2G based on the characteristics of wireless energy transmission, and discusses the feasibility of applying wireless power transmission to V2G charging and discharging energy interactive systems. A power flow control strategy is also given according to the constant current source characteristics of this topology. Finally, the effectiveness of this topology and related control strategy is verified by simulation.

Keywords: *Electric vehicle network, wireless charging, bidirectional converter.*

ICED066

Environmental Economic Accounting of Shenyang City Based on Energy Value

T.F. Chen, K. Chen

Analysis

ABSTRACT

Sustainable development has become an important theme of our country's development. People attach great importance to the quality of their development, so they have to measure the environment that has contributed to economic and social progress. But traditional GDP accounts have not been able to keep pace with the needs, so we need to adopt an environmentally sound accounting approach. Nowadays, most environmental economic accounting studies tend to consider the cost of resources and the environment as the basis of the pricing method. In order to compensate for the shortage of resources value, this paper attempts to adopt a complex framework of ecological system analysis, using Odum's theory and method, and then integrating emergy analysis and using energy value and monetary value to assess the loss of resource environment. The results show that (1) the economic growth of Shenyang is highly dependent on natural resources (including natural resources and inputs), which has resulted in severe environmental pollution between 2005 and 2011, (2) although Shenyang changed the way of economic growth between 2012 and 2014, the ecological environment has improved, but it is not obvious. Therefore, it is necessary to speed up the transition, to develop eco-industry and recycle economy, to get rid of the dependence of resource and environment, so as to prevent the economy from falling into a cycle.

Keywords: *energy value, environmental economic, Shenyang city, renewable environmental resources*

ICED031

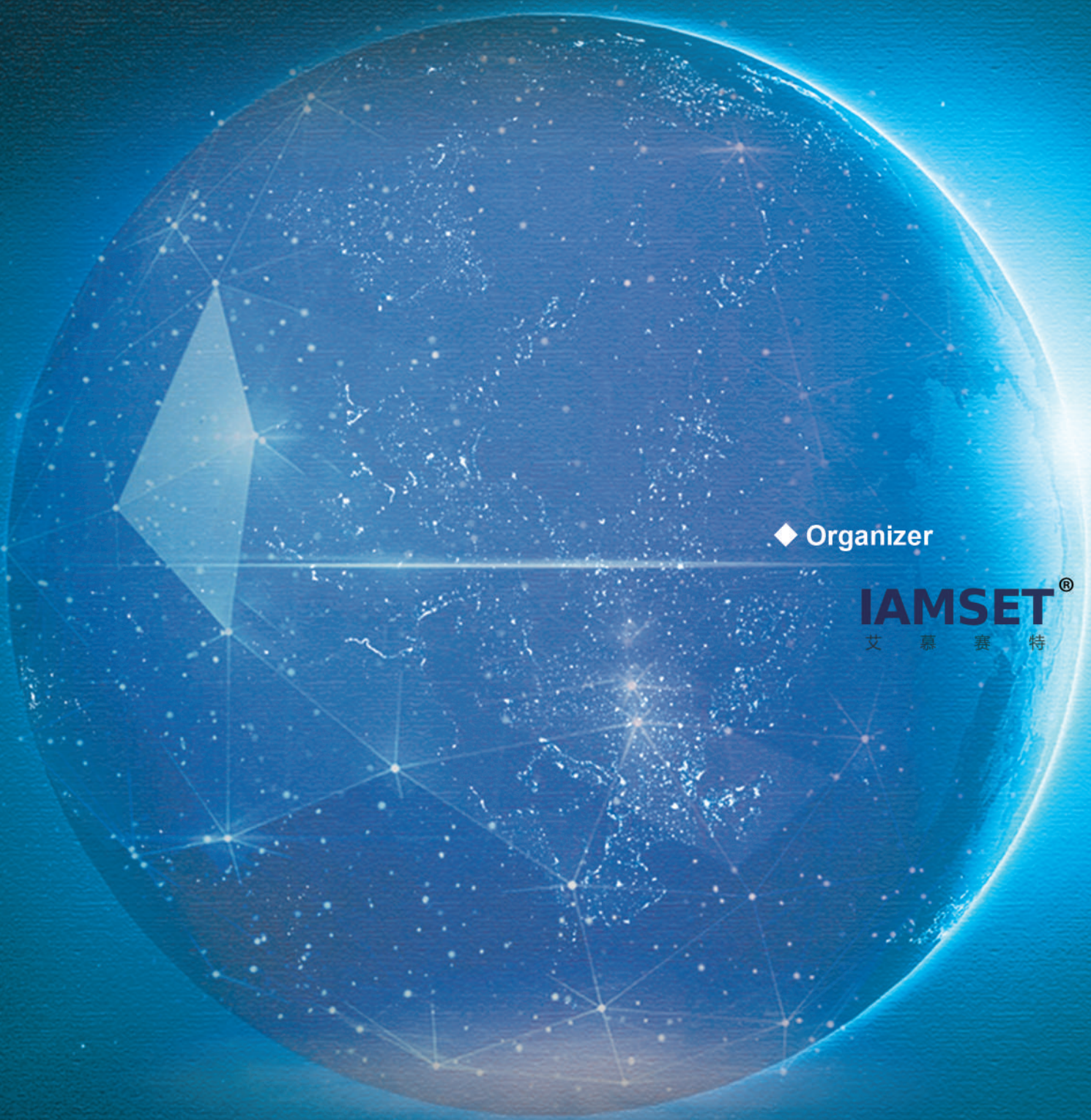
Single Tree Three-Dimensional Model Construction and Impact Factor Extraction that Based on Oblique Photogrammetry

W. Xi, Z. Shi, and D. Li

ABSTRACT

Based on the principle of digital photogrammetry and computer vision theory, the 3D model of vegetation canopy structure was constructed by image data orientation, matching, and aerial triangulation using the UAV tilt photogrammetry technique to extract the 3D model influence factor. To verify the correctness of the extracted factors, the vegetation point cloud data obtained from 3D laser scanning was used. Through example analysis, the results show that the factor data extracted by the model are reliable.

Keywords: *Unmanned aerial vehicles (UAV), oblique photogrammetry, three-dimensional structure model, 3 d laser scanning, point cloud data.*



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