Cumulative Index

Mathematical and Computer Modelling

Jiansheng Xia, Shasha Dou The study on steel elliptical cup drawing based on finite element analysis
Computer Modelling & New Technologies 2014 18(10) 7-13

The sheet metal elliptical cup drawing is a complex process, Under the assumption of Prandtl-Reuss flow rule and von Mises yield criterion, the incremental Elasto-plastic large deformation finite element model was established based on the Updated Lagrangian Formulation (ULF).The Elasto-plastic conversions of boundary and deformation are reduced with r_{min} rule. The friction phenomenon of slippage and viscosity at the boundary interface is revised with increment of revision Coulomb rule. The increment rules are led into the whole stiffness matrix, and derived out the stiffness equation. The studies show that the influence on steel elliptical cup drawing deformation is influenced by die structure and parameter. The dates show that finite element simulation and experimental result have a good consistency.

Keywords: elasto-plastic, FEM simulation, elliptical cup drawing

Hongjuan Zhang, Long Quan, Yan Gao Dynamic modelling and small signal analysis of push-pull bidirectional DC-DC converter
*Computer Modelling & New Technologies 2014 **18**(10) 14-18*

Bidirectional DC-DC converter can not only act as a contact bridge between two different voltage levels systems, but also can achieve the energy flow in both directions. However, due to the operating characteristics of the active switch and diode in the converter, thereby the inverter becomes a strong nonlinear circuit. In light of this, the push-pull bidirectional DC-DC converter is designed and the method of state space small signal analysis is proposed. First of all, the state-space equations of the converter are established. Then each variable of inverter circuit is averaged in a switching cycle to eliminate the influence of the switching ripple. The respective average variable expressions are decomposed into the DC component and AC small signal component. After the DC component of the signal is eliminated, the expression of the AC small signal component is obtained, to achieve the purpose of separating the small signal. Finally, the expression of small signal component is linearized, thereby the nonlinear system is approximated the DC operating point. This study will provide the theoretical foundation ready for the analysis and design of converter controller.

Keywords: dynamic modelling, state space averaging method, small signal analysis, linearization

Feijiang Huang, Jun Yang, Xiaochun Lu, Qingxiao Shan, Yongbin Zhou, Jianyun Chen, Zhuli Hu An inter-satellite dynamic ranging algorithm based on two-way time synchronization
*Computer Modelling & New Technologies 2014 **18**(10) 19-24*

Inter-satellite precise ranging is the foundation for all aerospace application systems in realizing autonomous navigation. To acquire a high-accuracy inter-satellite range, this study investigates an inter-satellite dynamic ranging algorithm. Referring to the simulation of inter-satellite range variation rules in constellation, this study analyzes the negative impact of satellite motion on inter-satellite ranging and proposes corresponding improved methods to eliminate the major error caused by satellite motion. This algorithm solves the minimal error in inter-satellite range using a combination of inter-satellite range fitting polynomial and inter-satellite clock-offset fitting polynomial, both of which are generated by two-way time synchronization data. Simulation calculation results show that the accuracies of inter-satellite ranging can be controlled within 3m provided that simulation error is considered. The algorithm can be used to improve the accuracy of inter-satellite dynamic ranging of various aerospace application systems.

Keywords: aerospace application systems, autonomous navigation; inter-satellite communication, two-way time synchronization, inter-satellite dynamic ranging

Shuo Zhang, Yingzi Li Multi-agent simulation of partner selection behaviour based on matching degree in collaborative product development process
*Computer Modelling & New Technologies 2014 **18**(10) 25-30*

Collaborative Product Development (CPD) process is characterized by autonomous task control, dynamic task sequence, and frequent team collaboration, which endow the process with high flexibility and uncertainty. To make

the process predictable and improve process efficiency, it is essential to model, simulate, and analyse the process by considering all these characteristics. Our work focuses on studying the human working behaviours in CPD process by agent-based simulation, which we think is the main source of process uncertainty and flexibility. In this paper, the partner selection behaviours are studied under the frame of agent-based simulation. In the simulation, the design agent selects his partner according to matching degree including ability and character. The simulation results indicate that the proposed utility strategy can effectively shorten the project total time of the case.

Keywords: collaborative product development, partner selection, multi-agent simulation

Meng Kong, Zhong-xiang Zhang, Xiao-jing Kuang, Ming-sheng Chen, Xian-liang Wu Solving electrically-large objects RCS based on 3-D vector parabolic equation method
Computer Modelling & New Technologies 2014 ***18****(10) 31-34*

The vector parabolic equation (VPE) method is introduced to calculate bistatic RCS of three-dimensional (3-D) electrically-large objects and polarization effects are fully taken into account. According to an approximate form of the vector wave equation and divergence-free condition the VPE was derived in this paper. The numerical results conducted on the scattering from perfectly conducting cube show the VPE agree with the exact method, and computation time is acceptable compared with the traditional full wave method.

Keywords: vector parabolic equation, electrically-large objects, radar cross section

Yanhong Guo, Wei Liu Empirical research on the diffusion of home appliances to the rural areas in china based on Bayesian estimated bass model
Computer Modelling & New Technologies 2014 ***18****(10) 35-39*

Quantitative research on the diffusion of Home Appliances to the Rural Areas in China is a very important topic both in theory and in application. Most of the research on diffusion focuses on the discussion and qualitative analysis of the policy. This paper expands the Bass model applications by leading an empirical research based on the history sales data of Home Appliances to the Rural Areas. The model has been estimated by both linear and nonlinear least squares method and Bayesian method separately, and predicts the maximum potential market in the end. This empirical research shows that Bayesian method performs best in predicting the diffusion of Home Appliances to the Rural Areas. Finally, the main factors influencing the policy implementation was analysed. It predicts the periodical sales and gives some suggestions to the government and enterprises accordingly.

Keywords: home appliances to the rural areas, diffusion of innovation, Bass model, Bayesian method

Xuhui Zhang Dynamic multi-species coevolution large-scale optimize based on the fuzzy clustering and trust region
Computer Modelling & New Technologies 2014 ***18****(10) 40-47*

Based on the above-mentioned studies, this article put the modified Fuzzy Clustering method into the particle swarm optimization, which solved the curse of dimensionality existing in the conventional algorithms. The large-scale parameter optimization method applied the modified Fuzzy C-Means method to clustering the large-scale dimension under the coevolution frame and achieved the valid dimension grouping. Later on, the dynamic neighbourhood topology multi-species particle algorithms divided the whole species into packets and constructed the subspecies sharing neighbourhood information, which improve the searching efficiency. The bring-in trust region could have the self-adapt adjustment for the particle optimization range, accelerate the optimizing speed, and decrease the iterations in the dead space. We use 20 standard large-scale testing functions for simulation. Compared with the top-ranked tournament algorithm, the mentioned algorithm achieved a better optimizing result in most functions, which surely laded the foundation of the large-scale neural network parameter optimization and the application in the control system.

Keywords: multi-species coevolution, particle swarm optimization, guzzy clustering

Jian Li, Xiyong Wu, Long Hou Analytical solution on the sensitivity of matric suction profile in soil layer which is under the condition of one-dimensional steady flow
Computer Modelling & New Technologies 2014 ***18****(10) 48-51*

To simulate the suction profile within unsaturated soil layer, which is under the condition of one-dimensional infiltration, the point that water potential energy is mainly composed of gravitational potential energy and suction potential energy was used. And this paper also takes the standpoint that the relationship between these two variables is reciprocal. Combined with the mass conservation law, *Darcy*'s law and *Gardner* empirical equation, an analytical solution was got. This solution could be used to describe the suction profile within unsaturated soil layer when the seepage field of this soil layer reaches steady stage and the rainfall infiltrates to the soil layer along with the vertical direction. Several conditions with different rainfall intensities q, different inverse values of air-entry pressure α and different ratio values of q/k_s were examined by using this analytical solution, respectively. Compared with other factors, the rainfall intensity will take more influence on the suction profile, namely, the suction profile within unsaturated soil layer is more sensitive to the change of rainfall. The results obtained in this paper could be used as one useful reference for the research work about rainfall-induce landslide and the corresponding computer simulation.

Keywords: analytical solution, unsaturated soil, matric suction, sensitivity, steady seepage

Pu Han, Li Meng, Biao Wang, Dongfeng Wang Improved particle swarm optimization algorithm with unidimensional search

Computer Modelling & New Technologies 2014 ***18****(10) 52-57*

In this paper, a strategy of unidimensional search is introduced to particle swarm optimization (PSO). The global exploration capability of PSO is used to identify a promising region in search space. With the region as the starting point, a unidimensional local search is applied to search a more accuracy solution. The local search does not rely on the population information, which makes it can jump out of a local optimum when the population stagnates. With combination of global exploration and local exploitation, the algorithm can discover more favourable search area effectively and obtain a better solution. The improved PSO method is tested on eight benchmark functions. Experimental results show that the method can not only improve the accuracy of solution, but also reduce the influence of initial population distribution upon the algorithm performance. Finally, the influence of parameter variation on algorithm is analysed.

Keywords: particle swarm optimization, unidimensional local search, population initialization, population distribution

Chengfang Tan, Caiyin Wang, Lin Cui SMS text similarity calculation based on topic model

Computer Modelling & New Technologies 2014 ***18****(10) 58-62*

The traditional text similarity calculation is mainly based on the statistical method and the semantic method, it exists data sparse and high-dimensional problems and so on. In order to improve the ability of SMS text similarity calculation, this paper puts forward a kind of similarity calculation method based on topic model. By using LDA (Latent Dirichlet Allocation) to model SMS document set and inference parameter via Gibbs sampling algorithm. The topic-word probability distribution and document - topic probability distribution of the SMS document set are generated. Then use JS (Jensen-Shannon) distance formula to calculate SMS text similarity, finally perform the text clustering experiments on the similarity matrix by single-pass incremental clustering algorithms. Compared with traditional text similarity calculation method, experimental results show that this proposed method can obtain better F-measure, which proves the effectiveness and superiority of the proposed text similarity calculation method.

Keywords: SMS text, similarity calculation, topic model, text clustering, latent Dirichlet allocation

Qinglin Huang, Lixin Zhang, Chaoyang Sun, Xiang Zhang An anti-collision algorithm for adaptive search matrix of cotton seed traceability system based on RFID

Computer Modelling & New Technologies 2014 ***18****(10) 63-68*

Focusing on the tags collision problem of traceability management system for the cotton seed quality and safety based on RFID, we proposed an adaptive search matrix for anti-collision algorithm based on ABS in this paper. Meanwhile, the concept of collision stack is put forward to effectively lower the time of request and transmission of redundant information in the proposed algorithm. The theoretical analysis indicates that this new algorithm performs superiority to the ABS.

Keywords: anti-collision algorithm, adaptive search matrix, RFID, traceability

Min Zhang Default assumption reasoning based on fuzzy description logics
*Computer Modelling & New Technologies 2014 **18**(10) 69-75*

Fuzzy description logics (DLs for short) provide a convenient tool for dealing with inconsistency and uncertainty. People can infer with uncertain and incomplete information. According to the characteristics and requirement of the knowledge representation, fuzzy DLs can play an important role in the commonsense reasoning. Default rules express concise pieces of knowledge having implicit exceptions, which is appropriate for reasoning under incomplete information. Default assumption reasoning based on fuzzy DLs is proposed. Possibility theory is used for representing both uncertainty and defeasibility. Inference service is considered in the logic and algorithms are provided for it.

Keywords: fuzzy description logics, default assumption reasoning, fuzzy reasoning

Wei Zhang, Qiu-li Wu, Yu-rong Deng, Ze-cheng Lv Case-based reasoning adaptive optimization algorithm for power transformer fault diagnosis
*Computer Modelling & New Technologies 2014 **18**(10) 76-81*

The adaptive learning rate for the introduction of case-based reasoning transformer fault type identification. The adaptive learning rate theory, through improved data normalization, typicality and best filtering diversity to extract the original example and optimal neural network. In the sample processing and analysis process to be solved according to the type of fault feature automatically adjusts the data processing methods, processes, boundary conditions and constraints to adapt statistical distribution, the probability characteristics. Examples show that this method can overcome the DGA data ambiguity and dispersion problems in the recognition accuracy and convergence speed advantage.

Keywords: Adaptive, Case-Based reasoning, neural network, fault type, normalization, data filtering

Huaping Zhou, Xutong Zhang The model construction and implementation of discrete physical system in industrial CPS
*Computer Modelling & New Technologies 2014 **18**(10) 82-89*

Cyber physical system referred as CPS, or information physical system, achieves the integrated coordination of the cyber world and the physical world. The collaborative system is more reliable and efficient. By analyzing the cyber physical system of integrated sense and control, the constructing approach of the discrete physical model is proposed and applied to mine surface production systems for CPS of the combination of discrete-time input and output and control functions. By modelling, analyzing and verifying the system, the cyber system and the physical system achieve deep fusion. On this basis, trusted software design, formal description methods and reasoning theory are established in the cyber physical system. It provides the authentication methods for the trusted software analysis and modelling of discrete physical system in the cyber physical system. The coal surface production system model is established by the model construction method of discrete physical systems in CPS proposed in this paper. The technology of computer, computer network and embedded systems is adopted to build the information world and achieve the integrated design and collaborative control of the subsystem in CPS. It is applied in a coal mine in the Huaibei Coal Mine Shares Limited Company and achieves good results. To speed up the wide applications to industries and enterprises of the CPS, a useful exploration is carried out in the paper.

Keywords: information world, physical world, discrete physical system, information fusion, credible design

Zhiyong Zhang, Hongli Guo, Lvwen Huang, Xiaoting Zhang Research on adaptive H-Infinity tracking for inhibition fluttering of picking robot arm
*Computer Modelling & New Technologies 2014 **18**(10) 90-98*

This paper aim at solve issue that conventional frequency domain theory is unsuitable for MIMO system and LOG theory is unsuitable for model perturbation, we commit to the research on H-infinity stability and focus on discuss design principles of H-Infinity stability system and methods on Riccati equation or inequality solution. As for the uncertainty and external interference, we discuss two-output equation or an algebraic Riccati state feedback equation using character on Riccati equation. According to the state space theory, we derive the controller to make structural equation to meet the requirement of state feedback and observer, and then draw suboptimal solutions in the form of

engineering management experience. To reduce the impact on interference to control stability by selecting the appropriate interference attenuation coefficient γ, so that its stability could be casted to meet harvest scene.

Keywords: H-infinity, Riccati equation, Interference attenuation coefficient, Domain theory

Yuliang Cong, Shuyang Zhang, Limin Xu, Lili Sun Spectrum allocation algorithm based on user requirements under the circumstance of advanced user existence
*Computer Modelling & New Technologies 2014 **18**(10) 99-103*

Since wireless spectrum is a non-renewable resource, how to improve the spectrum utilization is always the problem to be resolved by wireless communication technology. With the development of wireless communication technology, the contradiction between supply and demand for spectrum resource has been more and more intense. In this case, cognitive radio technology emerged. The traditional list-colouring algorithm aims at maximizing the number of allocated bandwidth; CSGC algorithm (Colour Sensitive Graph Colouring algorithm) is to achieve the maximum benefits of bandwidth for the cognitive users; local bargaining algorithm is an improved algorithm on time complexity based on CSGC. However, the three algorithms do not take the bandwidth demand of cognitive users into consideration. Even with the proportion allocation of CSGC algorithm, the problem of ill-considered for the bandwidth demands of cognitive users also exists, which results in irrational allocation of spectrum resources. To solve this problem, this article proposes a priority order with the consideration of cognitive users in spectrum allocation based on advanced users.

Keywords: Cognitive Radio, Spectrum Allocation, Graph Colouring, User Needs

Zhi Liu Approximate completed trace equivalence of real-time linear algebraic Hybrid Automata
*Computer Modelling & New Technologies 2014 **18**(10) 104-108*

In allusion to design simpler software system, the paper proposes approximate completed trace equivalence of real-time linear algebraic Hybrid Automata. Firstly, it pulls real-time linear algebraic program into Hybrid Automaton and establishes real-time linear algebraic Hybrid Automaton. Next, it uses matrix Frobenius norm to analyse approximation of real-time linear algebraic Hybrid Automata. Afterwards, it gets approximate completed trace equivalence of real-time linear algebraic Hybrid Automata. Finally, the Email virus spreading automata example shows that approximate completed trace equivalence of real-time algebraic Hybrid Automata can simplify automaton.

Keywords: Hybrid Automata, approximate, completed trace equivalence, algebraic program

Lei Huang, Zhi Liu Completed trace equivalence of inhomogeneous linear algebraic Hybrid Automata
*Computer Modelling & New Technologies 2014 **18**(10) 109-113*

In order to reduce states of inhomogeneous linear algebraic Hybrid Automaton, the paper proposes completed trace equivalence of inhomogeneous linear algebraic Hybrid Automata. Firstly, it introduces inhomogeneous linear algebraic programs into Hybrid Automata and establishes inhomogeneous linear algebraic Hybrid Automata. And then, it uses mathematical computation and completed trace equivalence to get completed trace equivalence of inhomogeneous linear algebraic Hybrid Automata. Finally, the travel queue automata example shows that completed trace equivalence of inhomogeneous algebraic Hybrid Automata can reduce states.

Keywords: Hybrid Automata, completed trace equivalence, algebraic program

Xiangyang Chen Local reconstruction and local fisher discriminant based semi-supervised dimensionality reduction algorithm
*Computer Modelling & New Technologies 2014 **18**(10) 114-120*

Local reconstruction and global preserving based semi-supervised dimensionality reduction (LRGPSSDR) algorithm gives no consideration to data locality when processing intra-class relationship and class relationship. Enhanced semi-supervised local fisher discriminant analysis algorithm (ESELF) also neglects locality of data manifold structure when maintaining data manifold structure. To address these problems, the local reconstruction and local fisher discriminant based semi-supervised dimensionality reduction (LRLFSDR) algorithm was proposed in this paper. It depicts significance of sample distance with an improved thermonuclear weight. In this way, intra-class relationship and class relationship of the same cluster attracts more attentions, thus enabling to shorten or widen intra-class distance or class distance firstly. Moreover, it uses idea of LLE algorithm to make neighbourhood linear reconstruction relationship of

each point in low-dimensional space to be similar with that in high-dimensional space, which takes locality of data manifold structure into account. Test result confirmed that the proposed LRLFSDR algorithm is superior to other semi-supervised dimensionality reduction algorithms in classifying standard libraries like COIL20, Extended YaleB and CMU PIE.

Keywords: local fisher discriminant, local reconstruction, semi-supervised learning, dimensionality reduction

Changhong Yan, Qin Dong, Hong Wang DDoS attacks defence strategies based on nonparametric CUSUM algorithm

Computer Modelling & New Technologies 2014 ***18****(10) 121-125*

In the Internet network attacks, distributed denial of service (DDoS) has aroused world attention because of its destructive power. It seems particularly difficult to defend against DDoS attacks for they have characteristics such as abrupt attacks, attacking host computer in a very wide distribution, and so on. To guard against network security and defend distributed denial of service attacks (DDoS), research should begin from the detection of DDos attacks. On the basis of deep research of DDoS attacks, the thesis summarizes and analyses the mechanism and principles of intrusion detection firstly. This paper starts with the analysis of the principle of DDoS attacks. Followed by inquiry and analysis of data packet of DDoS attacks detection, the thesis gives out the computation method for detecting DDos attacks based on Flow Connection density and presents a defending model against DDos attacks based on the temporal series of Flow Connection Condensity (Density). With the defending module based on the temporal series of Flow Connection Condensity (Density), data packet can be effectively filtered so that DDos attacks can be effectively defended and prevented. Finally, experiments prove that the module can effectively filter data packet from network.

Keywords: network security, distributed denial of service, flow connection density, time series, defence strategies

Kai Zhang, Tingsong Du, Tianbo Wang, Wenqing Liu Optimization model of power system unit commitment allocation problem considering the value-point effect and its simulation analysis

Computer Modelling & New Technologies ***18****(10) 2014 126-131*

Based on the studies of the allocation problem of large-scale unit commitment in the power system, a mathematical optimization model is established involving the valve point effect of unit commitment. The optimal solution obtained from the method that the standard artificial fish swarm algorithm (AFSA) is applied to the commitment allocation problem of three-units improves the result recently reported in literature. Considering the visual selection of AFSA affects foraging, huddling and other activities and convergence performance much when increasing the unit size, the proposed improved artificial fish swarm algorithm(IAFSA) in this paper uses the linear decreasing vision function instead of the fixed vision. It can speed up the convergence, jump out of local convergence effectively, and obtain a global optimal solution. Finally, the simulation comparing experiment is conducted for commitment allocation problem of ten-units. The simulation result shows that the IAFSA not only improves the convergence but also enhances the global search capability.

Keywords: unit commitment, valve point effect, linear decreasing

Information and Computer Technologies

Liang Li Software development for water quality's monitoring centre of wireless sensor network

Computer Modelling & New Technologies 2014 ***18****(10) 132-136*

Water quality's monitoring centre software of wireless sensor network is designed through applying C#.net and SQL database technology. The monitoring and querying of sensor node data is realized through adopting C/S (Client/Server) pattern. Standard structured query language (SQL) and ADO.NET database access technology are adopted to realize the rapid operation and efficient management on database. Graphical interfaces could display the topology and node status of sensor network, as well as the real-time and history parameters collected by each sensor node and so on. The practice has proved that this software could satisfy the data collection, as well as monitoring and management requirements of wireless sensor network monitoring system.

Keywords: wireless sensor network, water quality parameters, database, c#.net

Zhicheng Chen Automation control and design application of factory sewage disposal system
*Computer Modelling & New Technologies 2014 **18**(10) 137-140*

Intellectualization and automatization become the key technology of sewage disposal for effective realization of sewage disposal technology, continuous and stable operation of system and water quality standard. This paper took a full consideration on the function of online instrumentation in autonomous system and confirmed monitoring system scheme of three-in-one network (data, video and voice) and PLC control scheme adopting means of centralized management and decentralized control combining with sewage disposal technology. Factory adopts Ethernet looped network of optical fibre industry as backbone network for communication and located monitoring system at the central control room of comprehensive office building in sewage disposal factory. It realizes collection and monitoring of procedure parameter, analysis and processing of data, remote monitoring of core equipment. Coarse screen system subprogram, fine screen system screen, immersible pump subprogram, return sludge system program and return sludge system subprogram were detailed described according to technology requirement and design principle of PLC substation. It also discussed test quality guarantee of autonomous system.

Keywords: Sewage disposal, autonomous system, data communication, PLC system

Chenxiang Zhang Research on computer information integration based on some wireless sensor network model
*Computer Modelling & New Technologies 2014 **18**(10) 141-146*

Network model in wireless sensor integrates wireless communication technology, sensor technology and embedded computer technology. This new computer pattern is the joint elements in current network hot technology. Self-organizing feature Map is also termed as SOM network. It can solve conception problem, which can only be fulfilled by human brain nervous tissue. We integrated computer information applying SOM and wireless sensor technology to realize information integration model. We made a conclusion of the characteristics of wireless sensor network model and studied its protocol architecture. We induced information integration system into software engineering and developed it into application in all industries and areas in the perspective of definition, structure, classification and calculation of information integration. This paper integrated information's, reduce redundancy of information, decrease energy consumption and lengthen the service time of network by SOM wireless sensor network model. It also made a analytical research of case on information integration.

Keywords: wireless sensor, SOM network, information integration, network model, evaluation

Lingqiang Ran, Xiangxu Meng Example-based geometric texture synthesis: a survey
*Computer Modelling & New Technologies 2014 **18**(10) 147-150*

3D object modelling is a key step in computer animation industry. How to generate models rich in high quality geometric details is still a challenging task and affects the final visual effects of animation. Example-based geometric texture synthesis (EGTS) is a powerful tool to automatically build models with rich geometric details. Given a small patch of geometric texture as an example and an arbitrary model as a target model, using EGTS, we can change the surface of the target model to the new geometric texture style. EGTS has been studied a lot by the literature and many papers have been published. In this paper, we will summarize the influential papers and present our thoughts on this topic.

Keywords: example-based, geometric texture synthesis, survey

Xiaoyan Gao Two duality problems for a class of multi-objective fractional programming
*Computer Modelling & New Technologies 2014 **18**(10) 151-157*

In this article, we investigate the duality results for a class of non-differentiable multi-objective fractional programming problems. The parametric dual models and Wolfe dual models are formulated for this fractional programming. Weak, strong and strict converse duality theorems are established and proved based on the generalized invexity assumptions. Some previous duality results for differentiable multi-objective programming problems turn out to be special cases for the results described in the paper.

Keywords: invexity, multi-objective fractional programming, parametric dual, Wolfe dual

Zhuo Shi, Yinghui Li, Ke Yu, Yuanquan Cheng, Changshao Zhou Research of hand gesture using Kinect based on finger recognition
*Computer Modelling & New Technologies 2014 **18**(10) 158-162*

Using the depth image from Kinect, we present a novel method to archive the Hand Gesture Recognition (HGR). Firstly we overview the major technical components of the complete method. Then we elaborate several key challenges such as palm recognition, contour analysis and fingertip detection. We present the Biggest concave point detect schemes to contour analysis which is the key to achieving the HGR. Finally, we demonstrate the feasibility and effectiveness of the method by running the system.

Keywords: human-computer interaction, hand gesture recognition, finger recognition, Kinect

Zhenyu Zhang, Yong Qin Test method of railway video surveillance system
*Computer Modelling & New Technologies 2014 **18**(10) 163-167*

Test method of railway video surveillance system was mainly explored in this paper. In order to evaluate accurately railway video surveillance system, based on railway video surveillance system test platform, an objective, direct and effective test system was established for testing equipment requirements, system functionality and performance. In addition, it provides standard of railway video surveillance system and makes field of video surveillance standardization.

Keywords: railway, video surveillance, test method

Wang Li An Improved model of product design case reuse based on extension theory
*Computer Modelling & New Technologies 2014 **18**(10) 168-174*

This article studies the question of product design case reuse based on extension theory for complex product with various information, categories and attributes. It also proposes to use case space elementary system and case subject index elementary model based on elementary model of product design case research to describe complex design case. Besides, it also builds design case research and reuse model based on extension correlation function to acquire the most similar design result. The application of this method can acquire the design case closest to the design objective rapidly, thus improving the efficiency of product configuration, and shortening design period of complex product. Finally, it testifies the effectiveness of the model with application cases.

Keywords: Product Design, CBR, Design Reuse, Extension Theory, Artificial Intelligence

Shunliang Huang Definability of concept in incomplete information systems
*Computer Modelling & New Technologies 2014 **18**(10) 175-179*

An incomplete information table (a set) can be expressed as a family of complete information tables (sets). The family of complete information sets maybe constructs an interval set. A concept in incomplete information situation, called partially known concept, is said to be definable if its extension can be expressed as an interval set. The new definition of definability proposed in this paper, named interval definable, is different from its usual meaning in the rough sets theory where a concept is definable means that its extension is a definable set, which is the union of some equivalence classes. The new definition of definability not only provides a new interpretation of interval sets, but also endows more general meaning and deeper understanding of definability.

Keywords: incomplete information, definability, concept representation, interval sets, uncertainty

Wenqing Huang Research on multi-virtual queue based on flow estimation
*Computer Modelling & New Technologies 2014 **18**(10) 180-187*

To solve the equity issues in the network bandwidth competition of TCP/UDP mixed flow, we have raised an AQM algorithm framework based on “granularity”, which is aimed to realize the divide-and-rule goal of the conservative TCP and the greedy UDP so as to alleviate the equity issues of the network resources caused by different protocols by designing a common framework. Furthermore, under the AQM framework of “granularity”, we have brought forth Multi-Virtual Queue based on Flow Estimation (VFQ) and we have also given the detailed implementation schemes for different modules of VFQ algorithm. In order to further verify the feasibility and validity of VFQ algorithm, we have designed 5 computer network congestion scenarios in AQM network simulation platform and made simulation

comparisons with the classical ARED, PI and Blue algorithms. Numerous simulation results demonstrate that in contrast with other AQM algorithms, VFQ can better adapt to various sudden network congestion scenarios and it has better response speed and queue management performance.

Keywords: multi-virtual queue, flow estimation, TCP/UDP mixed flow

Yang Shi, Huipeng Li, Xianmu Li, Lu Wang Application of federated particle filter to SINS-GPS/BDS integrated navigation system
Computer Modelling & New Technologies 2014 ***18****(10) 188-191*

When integrated navigation information is filtered, there may be non-linear sub-filter. The paper proposes federated particle filter. It is based on the framework of federated Kalman filter and uses the method of particle filter to process non-linear sub-filter, which enhances adaptability of federated Kalman filtering model. The paper applies federated particle filter to SINS-GPS/BDS integrated navigation system to establish filtering model. The simulation is made to verify the effectiveness of federated particle filter.

Keywords: federated Kalman filter, particle filter, integrated navigation

Liming Wu, Wei Han, Songbin Zhou, Xin Luo, Yaohua Deng A compressed-domain audio fingerprint algorithm for resisting linear speed change
Computer Modelling & New Technologies 2014 ***18****(10) 192-196*

Existing compressed-domain audio fingerprint algorithms have been able to be used to recognize audio information effectively according to hearing content, and are robust to common time-frequency domain distortion, including echo, noise, band-pass filtering, 32Kbps@MP3 and so on. However, they are poor in resisting linear speed change, which is a very common method for audio processing. In this paper, we propose a novel compressed-domain audio fingerprint algorithm. It is robust to large linear speed change via using auto-correlation function to reduce unaligned degree of MDCT spectrum sub-bands' energy. Besides, it is similar with existing compression-domain audio fingerprint algorithms on the other aspects.

Keywords: compressed-domain audio recognition, audio fingerprint, linear speed change, robustness

Shoushan Liu, Maoyong Cao, Yan Chen System model of reconfigurable embedded motion control system based on IEC61499
Computer Modelling & New Technologies 2014 ***18****(10) 197-202*

Based on the function block (FB), and distributed system model of IEC61499 standard, the application and system model of embedded and reconfigurable motion control system are modelled. According the motion control system architecture built by embedded microprocessor and reconfigurable logic devices, the function block of IEC61499 can modified to describe the function unit which being used as the basic element to construct the application. Based on the modified function units, in combining with the distribute resources of reconfigurable logic devices, the distributed application model of the motion control system can be configured. To testify the application model, the interpolation process based on the digital differential analyser (DDA) of computer numerical control (CNC) system is carried out, and the results show that the application model is well performed to describe the embedded reconfigurable motion control system.

Keywords: IEC61499, function block, embedded reconfigurable system, motion control, function unit

Jie Zhang, Fuli Song, Jiali Tang Identification of crop weed based on image texture features
Computer Modelling & New Technologies 2014 ***18****(10) 203-206*

By using computer image processing technology, texture features of weed in the corn seedling field are analysed, and then we present an algorithm combining Support Vector Machine (SVM) to form a classifier and promote an improved method of RBF network. The experimental results show that the proposed method is effective.

Keywords: crop, weed identification, image texture features, support vector machine (SVM)

Xiang Zhang, Wei Zhang, Xiaoling Xiao Rapid detection of bedding boundaries based on borehole images
Computer Modelling & New Technologies 2014 ***18****(10) 207-211*

The bedding is an important sedimentary structure phenomenon. The rock bedding structure, the direction of

sedimentary transportation and the ancient sedimentary environment analysis can be studied by extracting the bedding boundaries and dips. Electric imaging logging can provide rich information of a borehole wall and circumference, which reflects formation resistivity variations. The bedding boundaries are detected by using the electrical imaging logging data based on an image recognition method in this paper. On an oriented, unwrapped image of a cylindrical borehole, the trace of a planar-bedding boundary appears as a sine wave. The bedding boundaries are detected by the recognition of the sine curves in borehole image. The influence problems of bedding boundary detection caused by fractures and other geological events are solved by statistical analysis technology. Through the techniques of the slope fitting, the speed and accuracy problems of bedding boundary detection are solved, which has good anti-interference performance. The processed results of the theoretical models and the measured borehole images at the varied dip segment indicate that the detected bedding boundaries reflect the real situation, which are identical to those derived by the Autodip.

Keywords: imaging logging, bedding boundary, object detection, image recognition

Xiaowei Hu, Jiexin Wang, Xuemiao Xu, Biao Zhou Moving vehicle detection algorithm based on motion edge extractor

Computer Modelling & New Technologies 2014 ***18****(10) 212-218*

In this letter, we propose a moving vehicle detection method based on motion edge extractor (MEE). In the course of the vehicle detection, the motion and contour information are prominent, so we combine them together to extract the moving objects with complete contours. We first modify the Gaussian Mixture Model (GMM) to estimate the background more precisely. Then an object extraction method in static image is proposed. The original image and the background image go through the object extraction method and a series of logical operations to get the moving areas. At last we apply a simple filling method to refine the result and accurately extract the vehicle areas. The experiment result shows that our algorithm is not sensitive to illumination and can detect the vehicles with similar colour to the road robustly.

Keywords: vehicle detection, motion edge extractor, video monitoring

Lei Zheng, Defa Hu A resource schedule method for cloud computing based on chaos particle swarm optimization algorithm

Computer Modelling & New Technologies 2014 ***18****(10) 219-223*

In order to improve the cloud computing resource scheduling efficiency, this paper proposed a method for cloud computing resource schedule based on chaos particle swarm optimization algorithm. Firstly, the resource scheduling options were taken as the position of the particle, and resource load balancing was taken as the objective function. Then the optimal resource scheduling solution was obtained by sharing information and the exchange of particles, while chaos mechanism was introduced to guarantee the diversity of particle swarm to prevent appearing premature convergence and local optimal solution. The simulation test was carried out in CloudSim platform, and the results show that the proposed method can quickly find the optimal scheduling solution for cloud computing resources and improve the efficiency of resource, and the method has better practicability and feasibility.

Keywords: cloud computing, resource scheduling, chaotic particle swarm optimization algorithm

Yulong Huang, Benyue Su, Jianqing Xi CUBPT: Lock-free bulk insertions to B+ tree on GPU architecture

Computer Modelling & New Technologies 2014 ***18****(10) 224-231*

B+-tree is one of the most widely-used index structures. To improve insertion process, several batch algorithms are proposed, which all use one thread to complete one node insertion and cannot make full use of GPU's parallel throughput. So, a batch building and insertion method on GPU named CUBPT is proposed in this paper. During the process of bulk building and insertion, CUBPT use one thread to insert one key, which can maximize the performance by GPU. The experimental results show that when build a 10M tree, the overall performance of CUBPT improved 25.03 times compare with four threads PBI. When insert 10M uniform keys into a 10M tree, the overall performance of CUBPT improved 13.38 times compare with four threads PALM; when insert 10M highly skewed keys into tree with same size, the overall performance of CUBPT improved 15.23 times compare with four threads PALM.

Keywords: in-memory B+-tree, bulk build, Lock-free batch insertion, GPGPU

Ping Yan, Teng Lv, Weimin He Probabilistic XML functional dependencies based on possible world model
Computer Modelling & New Technologies 2014 ***18****(10) 232-238*

With the increase of uncertain data in many new applications, such as sensor network, data integration, web extraction, etc., uncertainty both in relational databases and XML datasets has attracted more and more research interests in recent years. As functional dependencies (FDs) are critical and necessary to schema design and data rectification in relational databases and XML datasets, it is also significant to study FDs in uncertain XML datasets. This paper first proposed XML functional dependencies (XFDs) of deterministic XML dataset based on tree tuple models. Then two new kinds of functional dependencies based on possible worlds model for probabilistic XML dataset are introduced: probabilistic XML functional dependencies (pXFDs) and probabilistic approximate XML functional dependencies (pAXFDs). pXFDs extend the concept of XFDs of deterministic XML dataset by considering the probability of each possible world of probabilistic XML dataset, and pAXFDs extend the concept of probabilistic XML functional dependencies of probabilistic XML dataset by considering the degree of truth of tree tuples in each possible world of probabilistic XML dataset.

Keywords: uncertain XML, functional dependency, inference rule, closed set

Yu Bengong, Wang Liu, Guo Fengyi Security evaluation model for the enterprise cloud services based on grey fuzzy AHP
Computer Modelling & New Technologies 2014 ***18****(10) 239-244*

This paper analyses the application status of cloud services to identify four factors that affect the security of enterprise cloud services (ECSs), including platform facilities, operational safety, operations management, and legal factors. Based on the four factors, the grey fuzzy analytic hierarchy process (GFAHP) is used to construct an evaluation model for the security of ECSs. An example is investigated to demonstrate the proposed model.

Keywords: enterprise cloud services, cloud safety, grey fuzzy AHP, evaluation model

Liangong Song, Ke Han A novel distributed network database mapping scheme analysis
Computer Modelling & New Technologies 2014 ***18****(10) 245-251*

This research is based on distributed client-server model, and intends to add lacking fields in the target database by mapping in order to complete the database for subsequent analysis and tab the maximum economic value of a single database. This research takes China Industry, Commerce and Service Census Database (TTICSCDB) as the target database, and China Technology Innovation Survey Database (TTTISDB) as the assistant database. Then this research will employ techniques to mapping common fields from the assistant database to the target database and evaluate the accuracy of mapping. We will prove from the statistical perspective the simulation and accuracy of extension field of the network database proposed in this research. This network database will present its advantages in many ways.

Keywords: database, mapping, statistics, expanding

Jingbin Hao, Liang Fang, Haifeng Yang An improved boundary extraction method of STL model based on edge curvature estimation
Computer Modelling & New Technologies 2014 ***18****(10) 252-258*

To efficiently extract feature boundaries of the STL model, an improved method is proposed based on edge curvature estimation. Three curvature parameters (dihedral angle, perimeter ration and convexity) are used to estimate the surface curvature information of the STL model. Genetic Algorithm (GA) is used to determinate the threshold of feature edges. The extracted feature edges are grouped and filtered using the best-fit plane (BFP), which is calculated by Least Square Method (LSM). The Dijkstra's algorithm is used to close the incomplete feature boundaries. Several experimental results demonstrate that the amount of feature edges is significantly reduced, and useful feature edges are reserved to construct feature boundaries. The improved boundary extraction method has important significance in decomposing large complex STL models meaningfully.

Keywords: boundary extraction, curvature estimation, STL model, genetic algorithm, least square method

Tao Guo, Zhengqi Liu Application of TV image compression technology based on neural network

*Computer Modelling & New Technologies 2014 **18**(10) 259-262*

Aiming at the disadvantages of digital TV, including a large amount of information and redundant information, a method of TV image compression technology based on neural network combining neural network with image compression technology is proposed in the work. Firstly, the TV image is divided into blocks as the input of neural network to build the network; secondly, the blocks are rebuilt to realize image compression recovery. The simulations show that the neural network algorithm can achieve the TV image compression effectively and the number of neurons of the hidden layer based on the neural network algorithm has great influence on the building and training of the network by contrast. When the number of neurons of the hidden layer is less, the image compression ratio will be higher and the image compression quality will be lower.

Keywords: digital TV technology, image compression, neural network, hidden layer, compression ratio

Zhaozhun Zhong, Pengjie Qi, Miao Guan, Yuedong Xia, Yuanhui Fu Fabric defect detection system based on digital image processing

*Computer Modelling & New Technologies 2014 **18**(10) 263-270*

A fabric defect detection system based on digital image processing for textile fabric is proposed in this paper. The approach for the classification and identification of three commonly encountered classes of fabric defects (holes sto, missing end and mispick) is studied. The developments of both the hardware and software structures are presented. Firstly, median filter preprocessing and image segmentation based on Otsu threshold are applied to localize the fabric defects. Secondly, the features based on grey-level histogram and geometry are extracted. Thirdly, the classification and identification are accomplished by the method of artificial neural network based on the extracted features. Finally, a variety of textile images with different defects are tested to evaluate the performance of the proposed defect detection system. The experiment results indicate that the proposed system works efficiently with high accuracy, which can meet the requirements of the textile industry.

Keywords: fabric defect detection system, digital image processing, image segmentation, defects classification

Shuanglin Huang, Jianjun Tan Joint resource allocation based on Nash bargaining game for wireless cooperative networks

*Computer Modelling & New Technologies 2014 **18**(10) 271-276*

This paper considers the problem of resource sharing among selfish nodes in wireless cooperative networks. In the system, each node can be acted as a source as well as a potential relay, and both nodes are willing to achieve an extra rate increase by jointly adjusting their channel bandwidth and power levels for cooperative relaying. Nash bargaining solution (NBS) is applied to formulate the JBPA problem to guarantee fairness. Simulation results indicate the NBS resource sharing is fair and the fairness of resource allocation only depends on how much contribution its partner can make to its rate increase.

Keywords: Nash bargaining solution, bandwidth allocation, power control

Xiaoyu Zhang, Ning Liu Adhesive image segmentation based on watershed algorithm

*Computer Modelling & New Technologies 2014 **18**(10) 277-281*

Since adhesive image has a deficiency of over-segmentation, the work applied watershed algorithm, whose merits include quick computing speed, closed outline and accurate location, to adhesive image segmentation. In the first few sessions, the basic principle and arithmetic steps of watershed algorithm were illustrated in detail. On this basis, following sessions correspondingly introduced the MATLAB simulation analysis and verification. Through simulation and contrast of the segmentation results by different algorithms, it could be concluded that watershed algorithm, the most effective method, could help split adhesive objects into single ones, while greatly reducing or even eliminating the over-segmentation phenomenon.

Keywords: Image Segmentation, Edge Detection, Threshold Segmentation, Watershed Algorithm, Image Processing, MATLAB Software

Ning Liu, Xiaoyu Zhang An improved sift image matching detection

*Computer Modelling & New Technologies 2014 **18**(10) 282-287*

Aiming at the problems - edge response in the traditional SIFT descriptor and the insufficient correct matching feature points, the work proposed a kind of improved SIFT Image Matching Detection Algorithm. The candidate key point

was firstly detected by the SIFT algorithm; Canny edge detection algorithm was used to detect image edge points; it was judged whether the candidate key point needed to be eradicated by comparing whether the candidate key point equals to the coordinates of edge points; K-means clustering pattern, which is combined by the vector space cosine similarity and vector Euclidean distance similarity, was adopted to perform global image similarity matching. Finally, RANSAC algorithm was used to further get rid of the wrong matching. The experimental result indicates the improved method greatly enhances the stability of SIFT algorithmic and the accuracy rate of matching.

Keywords: SIFT operator, Canny operator, K-means cluster, accuracy rate, key point, edge detection

Changyou Guo, Xuefeng Zheng, Jianjun Liu Uncertain random fault tree analysis based on cloud security protection framework

Computer Modelling & New Technologies 2014 ***18****(10) 288-295*

Based on uncertainty theory and chance theory, this paper proposes a method that constructs and analyses fault tree. The fault tree is constructed based on logical relations between bottom events. Fault rate of bottom event would be characterized as random variable if it is obtained from historical data, it would be characterized as uncertain variable if it has no statistical data but is obtained from expert's subjective judgment. The chance that top event occurs is an uncertain random variable. The minimal cut set of fault tree is obtained by Boolean algebra method and at same time, the simplest standard disjunction expression of top event is obtained. This paper also constructs hybrid simulation algorithm to calculate the chance that top event occurs. At last validity of this method is confirmed by taking cloud security protection framework risk fault tree as example.

Keywords: Fault tree, Chance theory, Uncertain random variable, Cloud Computing, Cloud security

Operation research and decision making

Guirong Guo, Yan Lu Design and analysis of hotel management system based on information technology

Computer Modelling & New Technologies 2014 ***18****(10) 296-301*

With the rapid development of China's economic and tourism, competition in the hotel industry has become intense. Only by improving the means and methods of their management and improve their level of service constantly, can they receive adequate and healthy development. Therefore, the hotel operation computer management has become a priority task. These articles give a brief introduction to hotel management system design, in accordance with means of software engineering to do feasibility analysis, requirements analysis and design. The whole system divided into modules separately and introduce the function, while gives a set of criteria and the logical structure of the database of database management. These analyses and the guidelines basically meet the design requirements of hotel management system based on information technology, so as to improve the service quality and efficiency of the management of the hotel.

Keywords: hotel management, feasibility analysis, requirements analysis, database, logical structure

Jiahua Zhou GIS technology integration design based on university culture resource

Computer Modelling & New Technologies 2014 ***18****(10) 302-305*

3-D GIS technology has become the hot research in current GIS realm. It is applied in various industries. This paper constructed open and interactive 3-D data campus based on Sketch Up applying ArsGIS 3-D space platform and combining traditional information management system and 3-D GIS technology. We integrated various system resource management modules in campus and fulfilled an open campus project, which has strong inquiry and space analysis function. We turned 3-D model data into ArcGIS supportable format and imparted it into digital campus development structure. Browsing system of multi-detail and multi-level scene is also applied. Finally, we constructed a lively 3-D digital campus culture design that has interaction form.

Keywords: GIS technology, open type, interaction type, mutual integration

Yun Bai, Pu Wang, Jingjing Xie, Chuan Li An analysis model of urban water supply quality based on extension classification method

Computer Modelling & New Technologies 2014 ***18****(10) 306-312*

Directing at the multiple factors and levels in the complex problem of water consumption, this paper studied and analyzed the quality of urban water supply and put forward an analysis model of urban water supply quality based on

Extension classification method. Based on the Extension Theory, it modelled relative factors of analysis of urban water supply quality by matter-element method. Than classical domain and joint domain of relative factors of analysis of urban water supply quality were established. Via extension correlation function, the mapping relation between the water supply condition of the urban as research subject and the existing grades of urban water supply condition was established. Based on extension correlation, the grade of water supply condition of the present urban could be obtained. Thus, this grade can offer guidance for water supply of the urban and support for water supply strategy. Finally, by a case study, the model and algorithm were tested and proved feasible and operable.

Keywords: urban water supply, water consumption, extension theory, extension classification, model

Fasheng Yi, Xiaoling Li, Jimin Yuan New logistics distribution route dispatching mode based on genetic algorithm-ant colony algorithm

Computer Modelling & New Technologies 2014 ***18****(10) 313-318*

For multi-target route optimization with constraint conditions, the mathematical model for logistics distribution route optimization is built to accelerate response speed of logistics enterprises to customers, improve service quality, and strengthen the satisfaction of customers, and a new algorithm with the combination of genetic and ant colony algorithms is proposed to solve the selection issues of such logistics route. Initial pheromone is formed with genetic algorithm, based on which the optimal solution is rapidly sought with ant colony algorithm, and complementary advantages are achieved between above two algorithms. Application examples and simulations are available for calculation, and the results show that such algorithm is practical and effective to optimize logistics distribution route.

Keywords: logistics distribution, genetic algorithm, ant colony algorithm, combination, optimization

Tao Yi, Yunfei Zhang, Weichun Shen Research on the management of project cost data based on BIM

Computer Modelling & New Technologies 2014 ***18****(10) 319-323*

This article first analyses the differences between the BIM application mode and the traditional mode in the cost data management. With the application of BIM (Building Information Modelling), this article analyses the relationship between the standard framework of BIM and the whole process of cost management, then points out that the BIM application mode has changed the whole process of cost management and refines what the BIM standard framework should reflect about the whole process of cost management.

Keywords: BIM, cost data management, construction stage, participants in project

Li-ping Sun, Yong-long Luo, Xin-tao Ding, Fu-long Chen Spatial clustering algorithm with obstacles constraints based on artificial bee colony

Computer Modelling & New Technologies 2014 ***18****(10) 324-328*

Spatial clustering is one of practical data mining technique. In this paper, artificial bee colony (ABC) is used for clustering algorithm, which aims to optimally partition *N* objects into *K* clusters in obstacle space. The ABC algorithm used for clustering analysis with obstacles constraints, called The ABC algorithm used for clustering analysis with obstacles constraints ABC-CO, is proposed in the paper. By comparison with the two classic clustering algorithms, *k*-medoids and COE-CLARANS, demonstrates the rationality and usability of the ABC-CO algorithm.

Keywords: spatial clustering, artificial bee colony, obstructed distance; fitness calculation

Ning Lu, Leilei Yi Use of Petri Nets for maximum power point tracking in photovoltaic power generation system

Computer Modelling & New Technologies 2014 ***18****(10) 329-332*

Maximum power-point tracking is used to take full use of solar energy. The main object of this paper was to find a simple efficient technique to let photovoltaic power generation system working near the maximum power point of the solar arrays. The way of finding the suitable method of detection of the maximum power point and the strategy, which forces the system to work near this point was discussed. This project proposes a new way to realize the incremental conductance method by using high level Petri nets which is capable of tracking global maximum power point under condition change. This model will be evaluated by using stateflow in MATLAB. The result showed that this model is

effective.

Keywords: photovoltaic power generation, maximum power-point tracking, incremental conductance, high level, Petri nets

Shaohui Su, Pengfei Li, Zhangming Peng, Fanchao Wu, Chang Chen, Jiangang Wang Research on the knowledge flow evolving model for mechanical product innovation design

Computer Modelling & New Technologies 2014 ***18****(10) 333-339*

The innovation and competitiveness of product require the fulfilment of customers demand. The key is to acquire knowledge of customer needs. In this article, a design knowledge flow cognitive model was built on the traditional FES model, using the acquirement of product demand for a start. It fuses the user's demand, function, effect, structure, constraint and recycling of product for product innovation. According to the model, the level of knowledge classification and description methods was studied and an object-oriented description method of knowledge was proposed. The relation between knowledge and knowledge flow was analysed and so were the vertical relation and horizontal relation between each knowledge point. The evolution process of knowledge was researched based product family Take example for Curve sawing products to validate the proposed model in this article.

Keywords: innovative design, knowledge flow, jig saw

Jinchuan Zhang, Hao Yang HPN simulation model of carrying capacity of combination station for heavy-haul trains

Computer Modelling & New Technologies 2014 ***18****(10) 340-346*

Combination station for heavy-haul trains imposed restrictions on the whole heavy-haul railway system. Through analysis of particularities of operation of combination station, the paper established HPN simulation model of carrying capacity of combination station based on Petri net theory, a graphical modelling method. The simulation model took technical operations of arrival, combination and departure of trains as interconnected system, and output parameters related to carrying capacity of the station. Finally, the paper, took Hudong station in Datong-Qinhuangdao railway as an example to verify the validity and practicability of the model.

Keywords: carrying capacity, HPN, combination station, heavy-haul railway

Minning Wu, Fei You, Feng Zhang A new mutton logistics tracking algorithm for Internet of things based on PSO and neural network

Computer Modelling & New Technologies 2014 ***18****(10) 347-352*

In order to improve the particle filtering precision and reduce the required number of particles, to solve the neural network training algorithm has slow convergence speed, easily falling into local optimal solution, proposed a target tracking algorithm based on PSO particle filter, using of Bayesian method to sample the prior information and coupled PSO algorithm. For the existence of intelligent wireless sensor network energy constrained sensor nodes, limited communication features, the PSO optimization is introduced into the distributed particle filter algorithm to solve the existing distributed particle filter network traffic load is heavy and node energy consumption of high disadvantage. Then, we propose a new particle filter algorithm based on PSO and neural integration the algorithm makes full use filter tracking historical information, combined with predictions of particle filter, the detection signal of the sensor nodes were isolated, thus achieving the target tracking. Simulation results show that the target tracking algorithm based on particle filter PSO and neural integration can use a smaller computational cost, multi-target tracking problem solving, and practical system to meet the demand.

Keywords: particle swarm optimization, particle filter, neural network, tracking algorithm, internet of things

Jiaxiang Hu A system dynamics-based simulation experiment for aligning two anthrax progression models and their implications

Computer Modelling & New Technologies 2014 ***18****(10) 353-357*

Two models have been proposed in the literature to describe anthrax progression - the first is referred to as Compartment-B model, which has 22 states, and the other is called Incubation–Prodromal–Fulminant (IPF) model, which has 9 states. How do these two models differ from each other in terms of the indicators considered important by policy or decision makers? Does one always outperform the other based on key performance measures? This paper describes our experience of aligning these two models in the context of anthrax attack. We first develop two simulation

models using system dynamics to integrate the key indicators of emergency response, such as treatment rate, detection time, and treatment capacity. We then propose the process of model alignment and examine a large number of numerical examples to see whether the number of deaths, the stabilization time, and the demand for medicine produced by the two models will be reasonably equivalent. This study indicates that it is important for policy makers to understand the differences and similarities between the two models before making decisions. Furthermore, this research provides insights for scholars that rely on simulation tools for investigating bioterrorism attacks and for policy/decision makers that use these tools.

Keywords: Anthrax attack, Model alignment, Compartment model, Simulations, System dynamics

Xue Wu Economic benefit evaluation model of E-commerce based on DEA
Computer Modelling & New Technologies 2014 ***18****(10) 358-361*

E-commerce, a new business transaction mode, becomes the key drive of regional economic growth. Without time-space limitations and with different trade mode, higher cost efficiency of commodity circulation and informationization degree of transactions, E-commerce plays an important role in enterprise, industrial and even regional economic development. Based on microscopic and macroscopic perspectives, economic benefit evaluation model of enterprise E-commerce, economic benefit evaluation model of industrial E-commerce and economic benefit evaluation model of regional E-commerce were established using DEA. A deep analysis was conducted to applications of the established models, including economic evaluation before and after E-commerce, economic evaluation of different regions within the same time period, and economic evaluation of same region at different time periods of E-commerce promotion. Meanwhile, three pieces of improvement advices were given to facilitate continuous E-commerce development and increase economic benefit of regional E-commerce.

Keywords: DEA model, E-commerce, economic benefit, evaluation model

Qian Yi, Shang Tao, Qingming Zhan, Liming Bo, Jie Yin Research on outdoor wind environment of building groups based on computer simulation
Computer Modelling & New Technologies 2014 ***18****(10) 362-369*

Building outdoor wind environment is closely related to indoor air quality and thermal comfort of human, directly affecting the health and quality of life of people living and the building energy consumption at the same time. Enhancing natural ventilation in summer also helps reduce air-conditioning equipment uptime, reducing air conditioning energy consumption and green building should be particularly emphasized natural ventilation. However, in the irrational layout of the buildings or the too high buildings and other factors, outdoor wind will bring no comfort of pedestrians, but also easily lead to loss of energy and increase heating energy consumption, especially in the winter. In this paper, with the careful study of local wind data, wind environment simulation and evaluation and optimized design are conducted about two cases including teaching buildings of Faculty of Engineering in Wuhan University, as well as the modern trade mart layout in Rizhao city of china by using computational fluid dynamics (CFD) technique. Research shows that: 1) Teaching buildings of Faculty of Engineering in Wuhan University have bad ventilation in summer, which cannot meet the green building standards in China. It will bring discomfort to pedestrians on the days of large wind speed in winter and need for windproof design. 2) Through wind environment simulations of modern trade mart plan in Rizhao city, planning of program two is more reasonable than program one in the ventilation by adjusting the building pattern. Using the technique of CFD simulation can guide the existing buildings renovation and architectural planning and design optimization.

Keywords: wind environment, natural ventilation, building environment, computer simulation, CFD

Zhou Jinlin Research on the application of the Z-value analysis method in financial risk management of enterprise
Computer Modelling & New Technologies 2014 ***18****(10) 370-374*

As a method of measuring the bankruptcy risk of enterprise invented by the US scholar Altman, the Z-value analysis method is widely applied by people. According to the prediction of the model, an enterprise will go into bankruptcy if the Z-value is less than 1.20; it is the grey area if the value is between 1.20 and 2.90; the enterprise has no bankruptcy risk if it is greater than 2.90. Although the Z-value analysis method has been used for measuring the bankruptcy risk of enterprises for a long time, in fact, it reflects the risks through the financial indicators of the enterprises, so it can be

widely used for the financial risk management of enterprise. Through analysing the connotation of the Z-value analysis method, the paper explores the application of the method in the enterprise risk management from the specific calculation perspective and discusses the problems in application. Finally, some policy suggestions are provided for relevant decision-maker.

Keywords: z-value model, enterprise finance, risk management

Xihui Wu Research on internal control of accounting information in enterprises based on OPM model
Computer Modelling & New Technologies 2014 ***18****(10) 375-379*

OMP model is an important computing model in the data field, which is broadly applied in in the field of physics, mathematics, etc. In fact, OMP can be adopted in enterprises as well. In this paper, through in-depth analysis on the calculation method and content of OMP, the application principles, specific application methods of OMP in internal control of enterprise accounting information and existing problems was analysed in accordance with its effect, so as to establish an OPM model software evaluation system from the practical perspective and ultimately propose corresponding countermeasures for the application of OMP model in internal control of accounting information in enterprises.

Keywords: SOFC, OMP, accounting information, internal control, evaluation

Licheng Ren, Wenhui Pan Research on product characteristics affecting the transformation of B2B E-commerce
Computer Modelling & New Technologies 2014 ***18****(10) 380-386*

With the explosive growth of B2C and C2C Electronic Commerce (EC) in recent years, B2B EC has been tried in many fields, especially many traditional industries with little permeation into B2B EC, were transformed into B2B EC. However, the key factors influencing B2B EC transformation have not been fully investigated. On the basis of relevant literature analysis, product characteristics affecting B2B e-commerce transformation were divided into seven parts in this paper, namely, the product standardization, differentiation, tangibility, intangibility, time sensitivity, substitutability and complexity. Then, the proposed seven aspects were analysed using the method of the objective index weight, so as to obtain the mathematical model for product characteristics affecting B2B EC transformation. Finally, model test was conducted by taking Shanxi Pingyang Industry Machinery Co., Ltd. as an example, hoping the relevant research conclusion can provide references in decision-making for managers and other researches.

Keywords: B2B electronic commerce transformation, product characteristic, objective index weight

Chunjie Yu Research on supply chain surplus of low carbon supply chain coordination system
Computer Modelling & New Technologies 2014 ***18****(10) 387-392*

Supply chain coordination management plays an important role in reducing carbon emission in low carbon supply chain. This study introduces synergetics theory into the research of low carbon supply chain coordination management and reveals the operational mechanism and dynamic mechanism of low carbon supply chain management. Supply chain surplus is an order parameter of low carbon supply chain coordination management, which drives low carbon supply chain system to evolve and develop. It presents the formula of supply chain surplus based on its definition, analyses the components of supply chain surplus, proposes the approaches to realize supply chain surplus, supposes that allocation of supply chain surplus is a Pareto improvement issue, and discusses major basis of supply chain surplus allocation and the program of supply chain surplus allocation.

Keywords: supply chain surplus, low carbon, supply chain management, coordination management

Huilin Yuan, Jia Fu, Wei Hong, Jinbo Cao, Jing Li The application of BP neural network optimized by genetic algorithm in logistics forecasts
Computer Modelling & New Technologies 2014 ***18****(10) 393-397*

This paper points out disadvantages of traditional forecast methods and elaborates the advantages of the method based on BP neural network. On this basis, the paper puts forward a logistics forecasting model of BP neural network optimized by genetic algorithm. The new method uses historical data to establish and train BP neural network and thus obtain logistics forecasting model. The results implemented by MATLAB show that, neural network possesses

memorizing and learning capability, and can forecast logistics development trend perfectly, which is proved by a large amount of actual forecast results. Compared with BP neural network model, the model has the advantages of less number of iterations, convergence speed and strong generalization ability.

Keywords: BP neural network, genetic algorithm, optimized, MATLAB

Yuanmin Xie Product inventory model of iron and steel enterprises
Computer Modelling & New Technologies 2014 ***18****(10) 398-403*

As a pillar industry, iron and steel industry has made a significant contribution to China's economic development. Steel and iron inventory is a hot research issue in the supply chain management. How to make use of advanced management methods and mathematical models to obtain reasonable inventory to meet customer service and reduce unnecessary inventory-related costs, and accelerate corporate capital turnover rate, is the goal that the enterprises should pursue in the future. According to the batch production of iron and steel enterprises, and in consideration of inventory-related costs, including fixed costs, storage costs, shortage costs (including deferred delivery costs and lost sales costs), establish the model of finished products inventory cost. When calculate model, we make c + + program and do accurate calculation to the model, optimize the production cycle, production time and production quantities, and define the deferred delivery coefficients. By changing the value of the deferred coefficient, analyse the influence to the production cycle, production time and production quantities and all kinds of costs.

Keywords: Steel and iron industry; supply chain; inventory; finished products inventory; optimization

Zhang He College ideological instruction teaching method based on multimedia CAI
Computer Modelling & New Technologies 2014 ***18****(10) 404-410*

With the implementation of college ideological instruction teaching method reformation, multimedia and "three dimension" instruction method enjoy more and more popular among colleges. People place high hope on the new instruction pattern and regard it as the effective solution for education in college so far. This paper studies reformation of ideological instruction teaching method to analyse how to make use of multimedia CAI method and "three dimension" teaching method.

Keywords: college ideological instruction, multimedia network, CAI, "three dimension" teaching pattern

NATURE PHENOMENA AND INNOVATIVE ENGINEERING

Wenhui Li, Shengqiang Yang, Xiuhong Li Theoretical analysis and experimental verification of hole surface finishing parts
Computer Modelling & New Technologies 2014 ***18****(10) 411-414*

As the main method of improving surface quality, finishing technologies have been developed and applied rapidly in recent years, but they have certain limitations in the hole surface finishing. Based on the principle of centrifugal motion, a kind of hole surface finishing method with self-adaptive ability is putting forward in order to solve the finishing and cleaning problems effectively. The force of the grinding rod is analysed, so the relationship between speed and friction is defined by analysing the minimum speed of the finishing parts theoretically. Finishing parts are designed and experimental study is done. Research results show that hole surface roughness value Ra of seamless steel tube can reduce from 7.0μm to 0.3μm in 50s, which verifies the finishing effect and efficiency.

Keywords: finishing, hole surface, centrifugal principle, finishing effect

Shuang Zhang, Yuping Qin, Jing Xiao, Yihe Liu Research progress of implantable intra-body communication
Computer Modelling & New Technologies 2014 ***18****(10) 415-422*

The intra-body communication is an emerging wireless communication technology. According to coupling modes of electrodes, the intra-body communication is classified into two types, the capacitive and the galvanic coupling intra-body communication. The capacitive coupling communication is inappropriate for the medical implant intra-body communication because this communication mode requires the common grounding, while the galvanic coupling communication can exactly make up for the disadvantage of the former. In existing research overview, prototypes and experiments concerning the two coupling communication modes are thoroughly discussed, and research status of "surface-to-surface", "surface-to-implant", "implant-to-surface" and "implant-to-implant" communication methods is emphasized as per installation positions of electrodes. Furthermore, opportunities and challenges of the communication technology are presented as well as its prospects.

Keywords: intra-body communication, capacitive coupling, galvanic coupling, implantable, sensor

Yuankui Li, Yingjun Zhang, Feixiang Zhu, Jiandao Liu Task-role-based workflow authorization model and its implementation in emergency command system of water traffic
Computer Modelling & New Technologies 2014 ***18****(10) 423-427*

Water traffic plays an irreplaceable role in modern traffic as accomplishing heavy transport task in low cost, but the emergency frequency brings serious challenge to ensure safety and rescuing in water. At the same time, the safety supervision departments at all levels lack of modern technical means for prevention and action to emergency, so an emergency command system not only for safety supervision and risk early-warning in normal state, but also for quick response and scientific decision for emergency must be built. In this paper, by the use of the task-role-based workflow authorization model, an emergency command module is realized, which key technology is permission assignment. It accomplishes 7 tasks by 4 roles, besides, by the definition of user, role and task and constrains of relationship among them, and take use of delegation technology and right transmission between roles, emergency command process can executed methodically with high quality and clear target according to emergency plan.

Keywords: water traffic, emergency command, workflow, permission assignment

Shaofei Jiang, Zhifei Mao, Jiquan Li, Wei Zheng Temperature field numerical simulation and experimental study of rapid heat cycle molding in cooling process
Computer Modelling & New Technologies 2014 ***18****(10) 428-433*

Rapid heat cycle molding (RHCM) is a new technology aimed at obtaining green and high surface quality of plastic products. In this paper, the finite element model of the mould cavity in cooling process with RHCM was established for the transient heat transfer simulation using ANSYS. Thermal analysis results of temperature field were modified by experimental analysis, the results of which showed a good temperature uniformity and extraordinary efficiency of the cooling rate.

Keywords: rapid heat cycle molding, finite element model, cooling process, temperature field

Xinmin Ge, Yiren Fan, Donghui Xing, Yongjun Xu A novel method to calculate relative permeability of fluids based on fractal theory and core NMR experiment
Computer Modelling & New Technologies 2014 ***18****(10) 434-440*

An analytical relative permeability model based on fractal theory and NMR principle is described. The relationship between NMR transversal relaxation time (NMR T2) and resistivity index is deduced by fractal theory and capillary bundle model. The reciprocity theory of percolation field and electricity field is used to get the relationship between resistivity index and relative permeability. The 'Brooks-Corey/Burdine' equation was adopted to construct the relationship between relative permeability and NMR transversal relaxation time. By introducing the NMR parameters, the relative permeability model is improved since that it quantified the influence of pore structure. The results show that for water (wetting phase in water-gas system), the predicted permeability is exactly consistent with the experiment data, whereas for gas (the non-wetting phase in water-gas system), the fitted results is to some degree deviated from the experiment data and need more extensive research.

Keywords: relative permeability, fractal theory, NMR transversal relaxation time, reciprocity, pore structure

Dechen Yao, Limin Jia, Yong Qin, Jianwei Yang Faults diagnosis of railway rolling bearing by using time-frequency feature parameters and genetic algorithm neural network
Computer Modelling & New Technologies 2014 ***18****(10) 441-445*

This paper is focused on time-frequency feature parameters and genetic algorithm neural network techniques in fault diagnosis of railway rolling bearings. The time-frequency feature parameters for classification are extracted from vibration signals. However, the weak features of faults in rolling bearing are always immersed in noises of the environment, to solve this problem, Firstly, the wavelet analysis is used to filter and de-nosing and the time domain features are calculated. Secondly, the EMD (Empirical Mode Decomposition) method is used to decompose the signal into a number of intrinsic mode functions (IMFs), and then the IMF energy-torques could be calculated through the de-nosing signal. Finally, the genetic algorithm neural network is used for the classifications of the time-frequency feature parameters. The results of the time-frequency feature parameters and genetic algorithm neural network (GNN) show the

effectiveness and the high recognition rate in classifying different faults of railway rolling bearing.

Keywords: time-frequency feature parameters wavelet analysis, EMD, IMF, genetic algorithm neural network, railway rolling bearing, fault diagnosis

Zhigang Ma, Wenyi Liu Design and implementation of acoustic target recognition system based on TMS320F2812

Computer Modelling & New Technologies 2014 ***18****(10) 446-451*

In this paper, TMS320F2812 is adopted as the core component and the hardware circuit system is designed for acoustic target recognition, which includes signal conditioning circuit, A/D acquisition circuit, memory expanding circuit, power management circuit and data communication circuit, etc. The recognition algorithm was transplanted to the acoustic recognition system based on DSP, which enhanced the running rate in DSP. This system can accomplish acoustic signal sampling, pretreatment, feature extraction and recognition. On the basis of the simulation and real tests, it is proved that the acoustic target recognition system proposed in this paper is stable and reliable, which can satisfy the practical requirements.

Keywords: DSP, TMS320F2812, algorithm, acoustic target recognition

Yuguang Wang, Xingxing Dai, Xinyuan Shi, Yanjiang Qiao Mesoscopic simulation studies on the aggregation behaviour of glycyrrhizin micelles for drug solubilisation

Computer Modelling & New Technologies 2014 ***18****(10) 452-456*

Glycyrrhizin is a kind of natural surfactant with the micelle structure for drug solubilization and low toxicity in the human body. In this study, dissipative particle dynamics (DPD) and mesoscopic dynamics (MesoDyn) were carried out to elaborate the aggregation behaviour of glycyrrhizin micelles. Baicalin were selected as the poorly water-soluble drugs. It has been observed from DPD that glycyrrhizin molecules formed core/shell structured spherical, cylindrical and lamellar aggregates with the increase of concentration. Baicalin molecules are solubilized in the hydrophobic core. Glycyrrhizin molecules were easier to form micelles with the addition of drugs. Mesoscopic simulations based on experimental data provided more detailed information for the investigation of solubilization.

Keywords: mesoscopic simulation, dissipative particle dynamics, glycyrrhizin micelle, drug solubilization, aggregation behaviour

Dan Xu, Zhan Zhang, Long Yu, Yumei Wang Comparison of improved EMD entropy and wavelet entropy in vibration signals of circuit breaker

Computer Modelling & New Technologies 2014 ***18****(10) 457-461*

The paper is focusing on extracting the vibration signals of circuit breakers by using Empirical Mode Decomposition (EMD) that improved using least squares to lower the impact on experiment results effectively, which is caused by the EMD inherent end effects. First, work on the EMD and wavelet transform decomposition of both normal and loosening signals, and then to calculate the energy entropy. The results show that the value of improved EMD energy entropy is significantly larger than the wavelet energy entropy. So the improved EMD energy entropy can improve the accuracy of fault diagnosis and provides useful help for the mechanical fault diagnosis based on circuit breakers vibration signals.

Keywords: circuit breakers, vibration signals, energy entropy, EMD, wavelet decomposition

Fengwei Yuan, Qian Deng, Jiazhu Zou Fault diagnosis of nuclear facilities based on hidden Markov model

Computer Modelling & New Technologies 2014 ***18****(10) 462-467*

Due to the complex structure of nuclear facilities in a high irradiation environment, people are hard to approach it, In view of these situation a fault diagnosis method based on HMM (Hidden Markov Model) of capturing the audio signal while facilities are operating is proposed. With the strong modelling ability, HMM can be applied to analysing such as audio signal non-stationary time signal. By using this method, the original mechanical structures of nuclear facilities are not destroyed. The proposed sensors were needed as few as possible by the whole diagnosis system and which has a simple structure, low cost structure, the fault diagnosis rate is high and so on. State monitoring and fault diagnosis system of complex nuclear power equipment can timely and effective to provide running status and potential failure information for operating personnel, which has a vital significance for the safe and reliable operation of nuclear power equipment.

Keywords: nuclear facilities, Hidden Markov Model (HMM), fault diagnosis

Siqiang Wen, YunPeng Li, Yan Zhou Numerical simulation of dynamic responses caused by dynamic

compaction on backfilling foundation
*Computer Modelling & New Technologies 2014 **18**(10) 468-473*

Since the ground vibration caused by dynamic compaction threatens the structures around the site, a dynamics numerical simulation of the process of dynamic compaction is carried out based on the dynamic compaction experiment in the backfill soil site with the Finite Element Method (FEM) software. The calculated results present the vibration-time curves in radial and vertical directions on the ground in different distances. The characteristics of the vibration-time curves and how the peak velocity and acceleration change with distance are analysed. By comparing the simulated results with field data, the reasons which cause the differences are pointed out. Through comparison it is considered that the near-field dynamic responses in the simulation are more reliable than the far-field ones. According to standards the safe distances of each type of structures are evaluated. The relationship between energy utilization and the vibration energy is discussed, and that raising the aspect ratio of the hammer can reduce vibration is pointed out.

Keywords: dynamic compaction, dynamic response, backfill soil, simulation

Jing Jing Liang, Rui Qin Li, Jia Jun Ren Research on planetary bevel gear CVT system based on contact force
*Computer Modelling & New Technologies 2014 **18**(10) 474-478*

A virtual prototyping model for dynamical characteristic curves based on contact force was established, through the joint modelling (geometric modelling and constraint modelling) of planetary bevel gear CVT system in UG and ADAMS. The virtual prototyping experimental data proved that the system has the feasibility of over-zero variable speed. It is also verified that the model has advantage on continuously variable speed range, compared with planetary cone ring continuously variable transmission system. The main effect factors of the continuously variable speed performance and output torque are obtained. This model could be used to further study on such issues.

Keywords: planetary bevel gear, continuously variable transmission, virtual prototyping experimental, contact force

Hudai Fu, Jingang Gao Vehicle durability test based on user survey
*Computer Modelling & New Technologies 2014 **18**(10) 479-483*

The vehicle durability test is an important means of assessing and verifying the vehicle reliability. At present, the domestic automobile enterprises generally have some problems such as nonstandard test methods, the test mode insufficiently associating to the users in the vehicle durability test. It proposes a method for establishing the vehicle durability test mode in the paper, based on the theory of fatigue damage. Through the users' survey, the load acquisition and data analysis are carried out from the testing ground and the social roads by using of six-component force tester. It is proved, that the vehicle durability test method can not only shorten the test cycle, but also increase the appearance and countermeasures of adverse conditions. Meanwhile, it can reduce many kinds of adverse problems occur after the new vehicle coming into the market, and improve the quality of vehicle reliability.

Keywords: user survey, durability test, load collection, damage value

Gongfa Li, Wentao Xiao, Honghai Liu, Guozhang Jiang, Jia Liu Fuzzy control of flue temperature in coke oven heating process
*Computer Modelling & New Technologies 2014 **18**(10) 484-489*

Coke oven production possesses the characteristics of nonlinear, large inertia, large disturbances, and highly-coup ling and so on. Coke oven heating temperature was reflected by flue temperature and adjusted by gas flow. The control method of intermittent heating control is adopted in traditional heating control system of coke oven, and cannot satisfy the command of coke oven heating control. The control principle of combining the intermittent heating control with the heating gas flow adjustment is adopted according to analysing the difficulty and strategy of heating control of the coke oven. On the basis of researching deficiency of the existing control strategy, fuzzy hybrid control is proposed to establish heating intelligent control model of coke oven, which combines feedback control, feed-forward control and fuzzy intelligent control. Carbonization index is utilized in the model to control coking management of coke oven. Then heating fuzzy intelligent control structure of coke oven is built. According to artificial experience and actual conditions, the fuzzy controller is designed. Fuzzy control can deal with fuzzy, inexact or uncertain information and is extraordinarily robust, which can realize intelligent control of heating process of coke oven. Better control result of temperature control is realized by fuzzy intelligent control model. Intelligent control methods were used to adjust stopping heating time and heating gas flow. The practical running results indicate that the system can achieve heating

intelligent control of flue temperature, reduce temperature fluctuation, effectively improve quality of coke and decrease energy consumption, and has great practical value.

Keywords: coke oven heating, model, intelligent control, fuzzy control, hybrid control

Xikui Gao, Yan Bai, Yun Ju Load balancing over redundant wireless sensor networks based on diffluent
Computer Modelling & New Technologies 2014 ***18****(10) 490-496*

As the traffic blocking probability of traditional hard load balancing algorithms is generally high over redundant wireless sensor networks, This paper proposes a load balancing algorithm based on dividing the packet flow (LBD) over redundant wireless sensor networks based on the idea of soft load balancing. In the scheme, through numerical analysis, obtain the optimal flow-dividing ratio to determine the volume of traffic delivered to each network, which maintains network load balance. From the theoretical and simulative perspectives, the paper analyses the performance parameters, and the analytical results show that the performance of the scheme is better than other schemes. Simulation results show that the proposed method outperforms traditional hard load balancing techniques in terms of traffic blocking and packet loss probabilities.

Keywords: redundant wireless sensor networks, load balancing, packet flow diversion, access selection, handover

Dong-Sheng Xu, Feng Zhang A new optimization algorithm for multi-dimensional cloud data centre resources scheduling based on PSO
Computer Modelling & New Technologies 2014 ***18****(10) 497-502*

In order to solve the problem of multidimensional cloud resources low utilization ratio and the high energy consumption of cloud communication between tasks, proposed a new cloud data centre resource scheduling algorithm, which combined resource fusion principle, particle swarm optimization algorithms and taboo search algorithm and it's with a low-power scheduling computing, storage and bandwidth resources integration scheduling method. Simulation results show that the algorithm has the advantage of cloud resources using stable, high-dimensional cloud resource utilization and low-power cloud data centres.

Keywords: particle swarm optimization, cloud computing, cloud data centre, data scheduling

Ze Liu, Gongfa Li, Honghai Liu, Guozhang Jiang, Jia Liu Temperature field and thermal stress field of continuous casting roller bearing
Computer Modelling & New Technologies 2014 ***18****(10) 503-509*

The work condition of continuous casting roller bearing was high temperature, large load and complex. If the heat, which the bearing accepted could not be distributed effectively and cooling was not in place, the high temperature would cause bearing thermal deformation and rupture under high loads, resulting in bearing premature failure, affecting the entire casting steel production. The cooling way for the continuous casting roller bearing seat was by the internal cooling water holes which in the bearing seat. Based on the ANSYS, the temperature field of continuous casting roller bearing seat was analysed. The three-dimensional geometric model and the CAE model of the bearing seat was established, and the synthesize convection heat transfer coefficient of bearing seat would be obtained through analysed the principle of heat transfer. Took it as the boundary condition, and load the temperature in the real-time condition. Analysed temperature field of the continuous casting roller bearing seat in the stable work condition, got the overall distribution of bearing seat. Meanwhile, it could draw the conclusion that thermal load what bearing carried was the cause of bearing damage through the thermal stress analysis of the continuous casting roller bearing. It provided advice and guidance on appropriate optimization of the bearing to improve bearing life. And just the above analysis provided a theoretical guidance for the design and installation of continuous casting roller bearing

Keywords: continuous casting roller, bearing seat, temperature field, CAD three-dimensional geometric model, CAE model, stress field, thermal coupling field

Zhenchang Zhang, Changying Wang Review of the development of ocean data assimilation
Computer Modelling & New Technologies 2014 ***18****(10) 510-515*

Data assimilation compensates for the deficiency of a numerical model and minimizes the short-term forecasting error by combining observation data and numerical results. Data assimilation has become a popular research topic all over the world in recent years. The development of ocean data assimilation is introduced in this paper. 4D variational and Kalman filter methods are considered the best means of data assimilation. Thus, these two methods are described in

detail. Several novel research methods of assimilation, including assimilation with a constraint condition and dimensionality reduction, are discussed.

Keywords: data assimilation, 4D variational, Kalman filter

Anatolii Pashko Simulations of standard Brownian motion
Computer Modelling & New Technologies 2014 ***18****(10) 516-521*

This paper investigates algorithms for simulation of the trajectories of a Brownian motion (Wiener process) with given accuracy and reliability. Spectral representation of Wiener process as random series examines as a model. Estimates of the accuracy and reliability investigated in various function spaces - spaces of measurable integrated functions, Orlicz spaces and spaces of continuous functions. Given the accuracy of the numbers and simulation algorithms error of Gaussian random variables in the model are used strictly sub-Gaussian random variables. Examples of simulation are represented below.

Keywords: Wiener process, simulation, sub-Gaussian model, accuracy and reliability

Rong Zeng, Zhengfeng Jiang, He Ling, Wei Hu, Xing Wan Order analysis method based on instantaneous phase
Computer Modelling & New Technologies 2014 ***18****(10) 522-528*

Order analysis is an effective method to analyse non-stationary signal of rotating machinery. The key of this method is to acquire the time sequence under even angle re-sampling. This paper proposed an order analysis method based on instantaneous phase using Hilbert-Huang Transform (HHT), and achieved the order spectrums of torsional vibration signals of rotating machinery from simulation and experiment. Being different from the order analysis method based on instantaneous frequency, this method directly uses the instantaneous phases obtained by HHT to get rotating angle over time. Thus, it is faster and more convenient. Meanwhile, this method is less affected by the 'boundary effect'. Hence, it can achieve higher precision. The simulating and experimental analysis both verified the feasibility and accuracy of this method.

Keywords: order analysis, even angle sampling, HHT, instantaneous phase

Yanru Xue, Yinghua Yao, Min Liu, Feng Wang The study of communication fibre amplifier based on doped nano-scale semiconductor materials
Computer Modelling & New Technologies 2014 ***18****(10) 529-536*

This paper firstly describes the development of communication fibre with InP-doped nano-scale semiconductor materials in detail, and then discusses its important dispersion characteristics, starting from the definition of fibre materials dispersion to explore the affected factors of dispersion, different dispersions on fibre as well as the dispersion features of single mode fibre. From the perspectives of experimental and theoretical calculations, it analyses the dispersion characteristics of drawing and doped nano-scale fibre. Thus, it will have much broader prospects for sano-scale semiconductor materials as doping fibre amplifier in communication.

Keywords: nano materials, communication optical fibre, fibre amplifier