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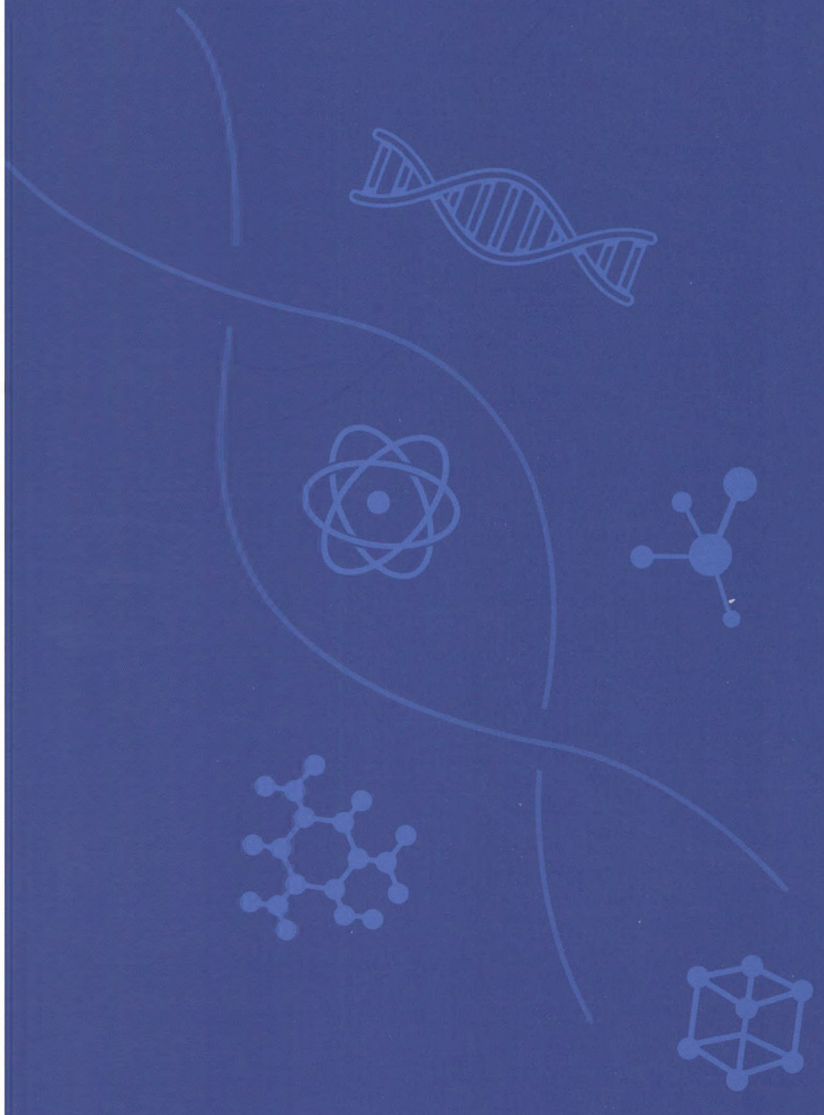
自然科学版
Natural Science Edition



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Journal of East China University of Science and Technology
(Natural Science Edition)
Vol. 44 No. 6 December 2018

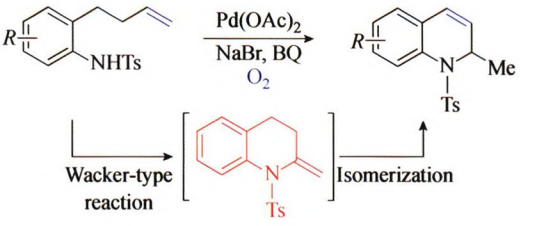
CONTENTS

Palladium-Catalyzed Intramolecular Wacker-Type Reaction for the Synthesis of 1,2-Dihydroquinolines

ZHANG Jin-gang, LI Yun-yi, WU Zheng-xing, ZHANG Wan-bin

Journal of East China University of Science and Technology (*Natural Science Edition*), 2018, 44(6): 816-822.

A method involving the Pd-catalyzed Wacker-type reaction and isomerization of alkene was developed, for the preparation of a series of 1,2-dihydroquinoline derivatives. The reactions proceeded smoothly for different substrates in the optimized standard conditions, whether the substrates bearing substituent groups at different positions on the benzene ring or substrates bearing different substituent groups.



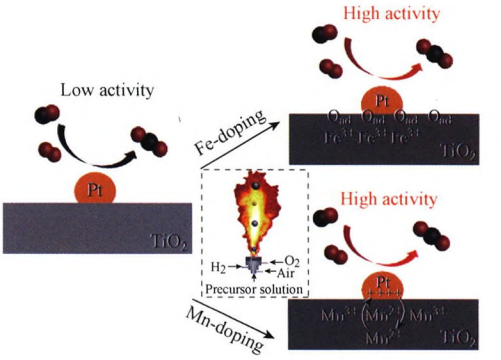
· Materials Science and Engineering ·

Transition Metal *In situ* Doping Pt/TiO_2 by Flame Spray Pyrolysis for CO Oxidation

ZHAO Xing, HU Yan-jie, JIANG Jie-chao, LI Chun-zhong

Journal of East China University of Science and Technology (*Natural Science Edition*), 2018, 44(6): 823-830.

A Pt loading catalytic system was prepared by flame spray pyrolysis (FSP), and the activity of Pt/TiO_2 system in CO oxidation was largely enhanced by *in situ* doping Fe and Mn in the spray flame. Both of the samples showed much higher activity than the pure Pt/TiO_2. The TOFs of Mn-doped Pt/TiO_2 increased by an order of magnitude at 30 ℃.

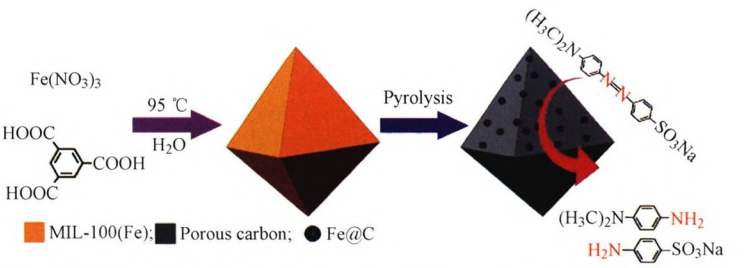


In Situ Reduction of MIL-100(Fe) to Prepare Porous Carbon-Iron Composite and Its Performance in Removing Methyl Orange

CHENG Jian-jun, WU Chao, WANG Zhe, GU Jin-lou

Journal of East China University of Science and Technology (*Natural Science Edition*), 2018, 44(6): 831-838.

A novel method to carbothermally synthesize porous carbon-iron composite by using MIL-100 (Fe) as a precursor is reported. nZVI was uniformly distributed in the carbon matrix with high-loading and controllable particle size. The removal efficiency of nZVI/C for MO from polluted aqueous solution was investigated.

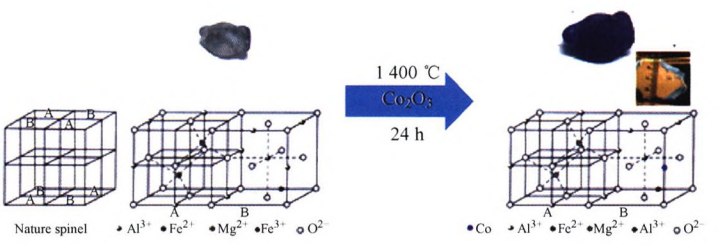


Analysis and Identification of Cobalt Lattice Diffused Vietnam Spinel by Using UV-Vis-NIR Spectroscopy

WANG Jia-wei, WANG Yi-qun, FENG Qi, WU Xiao-yu, CHEN Jun-xu

Journal of East China University of Science and Technology (*Natural Science Edition*), 2018, 44(6): 839-844.

The spinel's color, by cobalt lattice diffusion at the stable temperature of 1 400 ℃ for 24 h, changes from gray-blue to vivid-blue. The color of spinel treated only exists upon the surface. Whether the spinel has been treated by cobalt lattice diffusion or not, the color can be detected with an effective way of immersion method.

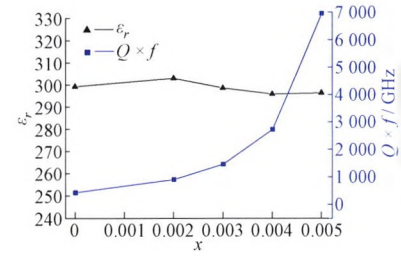


Structural and Dielectric Properties of $SrTi_{(1-1.25x)}Nb_xO_3$ Ceramics

FU Wen-ping, LI Wei, HAN Rui

Journal of East China University of Science and Technology (Natural Science Edition), 2018, 44(6): 845-848.

When x increases from 0 to 0.005, the dielectric constant (ε_r) of $SrTi_{(1-1.25x)}Nb_xO_3$ ceramics is unchanged basically, while the $Q \times f$ value is accelerated. When x is 0.005, the excellent microwave dielectric properties, *i.e.*, 296.41 of ε_r, 6 953 GHz of $Q \times f$ value could be obtained for the ceramics of $SrTi_{(1-1.25x)}Nb_xO_3$ ($SrTi_{0.99375}Nb_{0.005}O_3$) dielectric.



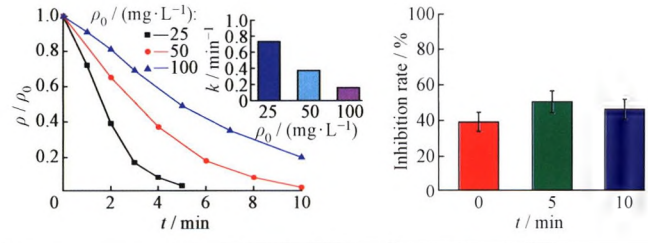
• Resources and Environmental Engineering •

Photo-Degradation of Tetrabromobisphenol A by UV Light in Aqueous Solution

GU Yong, SUN Xian-bo, LIU Yong-di

Journal of East China University of Science and Technology (Natural Science Edition), 2018, 44(6): 849-854.

The acute toxicity of Tetrabromobisphenol A (TBBPA) under UV photolysis is investigated and the degradation pathway of TBBPA under UV is proposed through the determination of photolysis intermediates by GC-MS.

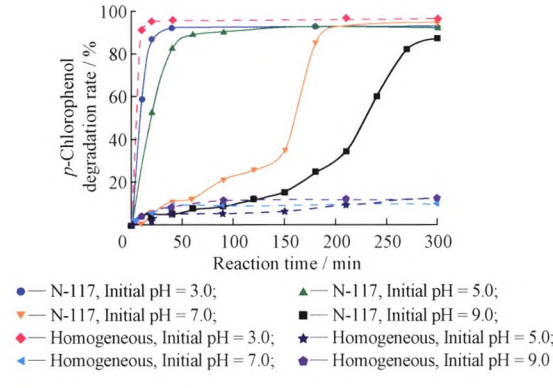


Catalytic Degradation of *p*-Chlorophenol by N-117 Supported Fe (Ⅱ) Catalyzed Heterogeneous Fenton Reaction

LI Jia-yi, SUN Xian-bo, LIU Yong-di

Journal of East China University of Science and Technology (Natural Science Edition), 2018, 44(6): 855-861.

Fe(Ⅱ) loaded N-117 was used to degrade *p*-chlorophenol. This novel heterogeneous Fenton catalyst can effectively catalyze H_2O_2 decomposition, reduce the inhibition of chloride ion on *p*-chlorophenol degradation, and widen pH range of Fenton reaction, with limited dissolved iron concentration. Under chloride mass concentration of 500 mg/L, humic acid mass concentration of 25 mg/L, *p*-chlorophenol degradation rate reached 87.0% and 90.2% respectively.



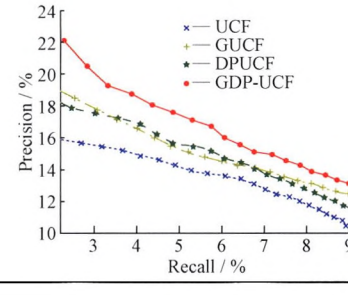
• Information Science and Engineering •

Collaborative Filtering Recommendation Algorithm Based on Genre and Density Peaks Clustering

CHEN Fan, SUN Zi-qiang

Journal of East China University of Science and Technology (Natural Science Edition), 2018, 44(6): 862-868.

To meet users' individual needs, a collaborative filtering recommendation algorithm based on genre and density peaks clustering (GDP-UCF) is proposed. Density peaks clustering algorithm is combined to research items' attributes and analyze users' interests in different clusters of items. Inverse document frequency is used to optimize the algorithm, which improves the identification degree of items' characteristics and users' interests.

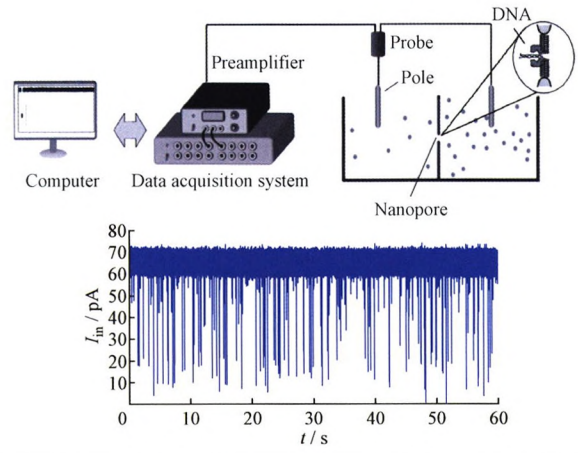


Design of a Novel Sensing Probe for Nanopore Single-Molecule Detection

YAN Bing-yong, ZHU Ming-qiao, WANG Xue-wu

Journal of East China University of Science and Technology (Natural Science Edition), 2018, 44(6): 869-875.

Based on the detailed analysis of the structure of the probe and the properties of the measurement bandwidth, an improved high-precision acquisition probe system for nanopore single-molecule detection is designed, which utilizes the method of precompensation. The method can not only expand the measurement bandwidth of the original measurement system, but also flexibly configure zero point and pole point of the system to speed up the dynamic response process of the system.

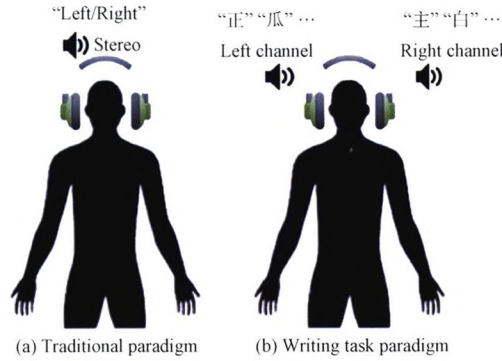


Chinese Characters Writing Task Based Motor Imagery Paradigm Using Auditory Cues

QIU Zhao-yang, JIN Jing, WANG Xing-yu

Journal of East China University of Science and Technology (Natural Science Edition), 2018, 44(6): 876-881.

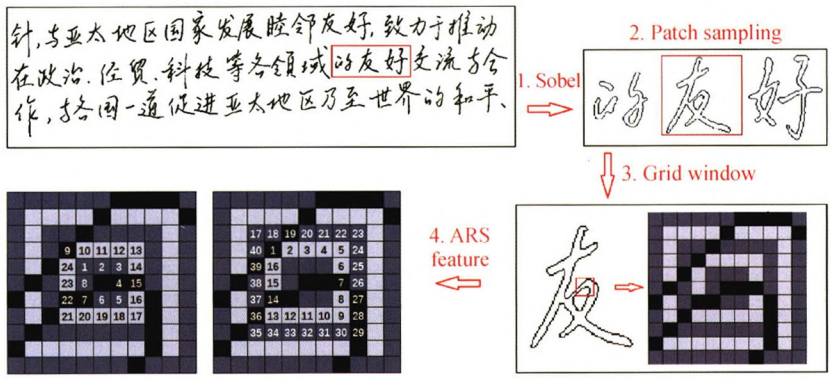
The new paradigm prompts subjects to imagine writing Chinese characters by left and right channels. It overcame the deficiency of the traditional paradigm which only prompts the imaginary object (left or right hand), not the specific content of imagination. Subjects could imagine hand movements following the sequence of writing strokes in the Chinese character.



Text-Independent Writer Identification Method Based on Chinese Handwriting of Small Samples

QUAN Zhi-nan, LIN Jia-jun

Journal of East China University of Science and Technology (Natural Science Edition), 2018, 44(6): 882-886.



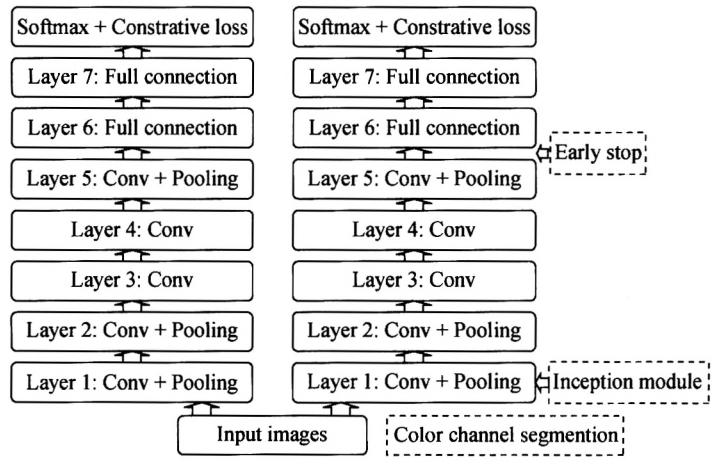
Adjacent ring structure (ARS) feature algorithm is proposed to improve the problems that samples have fewer characters and loose handwriting pattern conditions. And Deep belief network (DBN) is used to train the identification models of different writers. The method achieves similar performance to other past identification methods using large amount of characters on HIT-MW handwriting identification database.

Deep Learning Based Fast Plant Image Recognition

ZHANG Xue-qin, CHEN Jia-hao, ZHUGE Jing-jing, YU Li-jun

Journal of East China University of Science and Technology (Natural Science Edition), 2018, 44(6): 887-895.

A plant recognition algorithm based on the optimized P-AlexNet model is proposed, which uses inception module and adds contrastive loss function in the siamese network after full connection layer. The model training uses an image dataset containing 206 plants and the validation accuracy of the model is 86.7%.

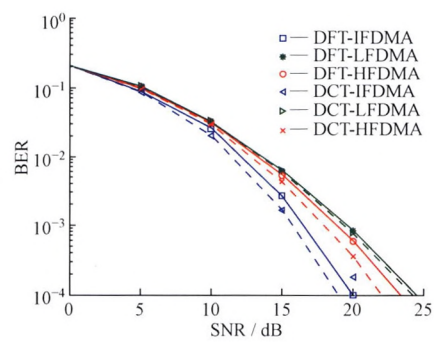


Hybrid Subcarrier Mapping Method Based on DCT-SC-FDMA

CHEN Chen, WU Yao-jun

Journal of East China University of Science and Technology (Natural Science Edition), 2018, 44(6): 896-900.

We mainly study uplink SC-FDMA technology and use discrete cosine transform (DCT) instead of discrete Fourier transform (DFT) to improve the performance of BER. Simulation results show that the proposed DCT-HFDMA method can improve the performance of BER in view of that the PAPR performance is similar to that of LFDMA.

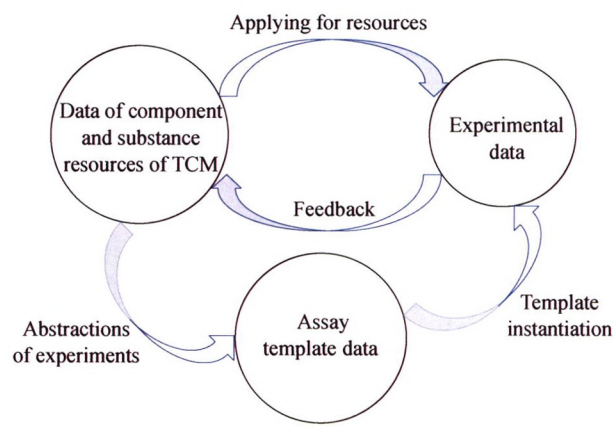


Resource and Assay Library for Components and Substances of Traditional Chinese Medicine

LI Jian-hua, LIU Zhi-chao, ZHENG Jian-li, SHI Zhe-zhi, FAN mi, LI Hong-lin

Journal of East China University of Science and Technology (Natural Science Edition), 2018, 44(6): 901-908.

A resource and assay library for components and substances of TCM is proposed. Assay template data are defined as a new class of data to enhance the association of resource and experiment. All resource data, assay template data and experimental data are integrated into a unified model as well as a Web-based library for experimental support and resource management.

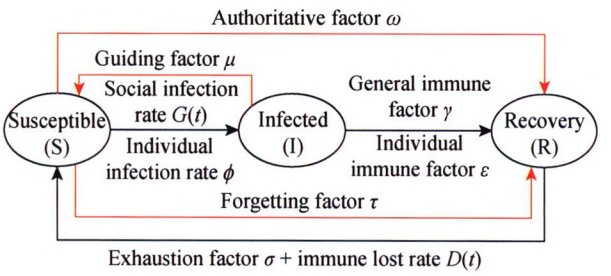


Crowd Emotional Contagion Model Based on the Epidemic Mechanism under Emergencies

HE Gao-qi, BIAN Xiao-hui, SUN Fei, LU Xing-jian

Journal of East China University of Science and Technology (Natural Science Edition), 2018, 44(6): 909-917.

This paper proposes an improved crowd emotional contagion model E-SIRS, considering the influences of crowd environment, individuals and social factors on individual emotional states in emergency under self-organization conditions. And then from the perspective of complex dynamical systems, the Lyapunov method is utilized to calculate the equilibrium stable point of this model.

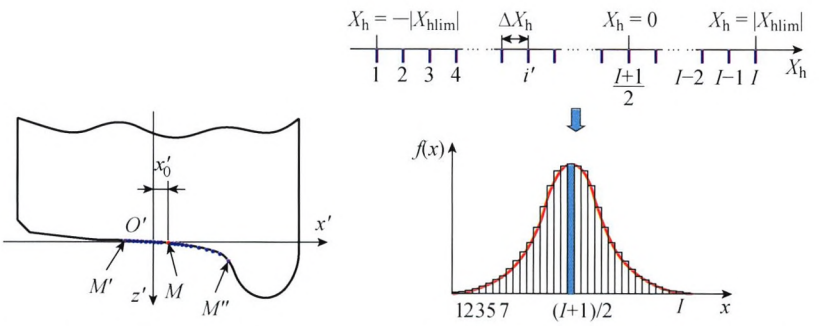


• Mechanical and Power Engineering •

Calculation Method of Wheel/Rail Rolling Contact Fatigue Life

HUANG Long-wen, LI Zheng-mei, AN Qi

Journal of East China University of Science and Technology (Natural Science Edition), 2018, 44(6): 918-927.

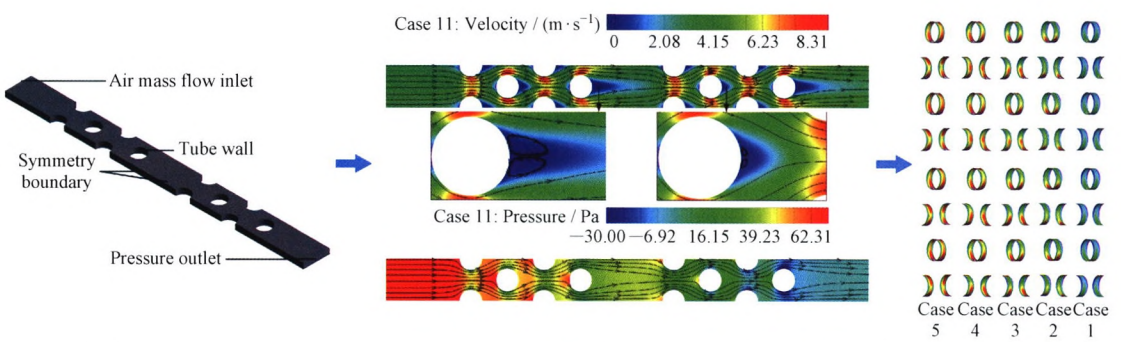


A method to calculate the fatigue life damage of wheel surface and predict fatigue life on actual railway is reported. The contact probability of wheel surface contact points after discretization is calculated by normal distribution. The methods of wheel rail contact stress calculation, fatigue damage accumulation hypothesis and fatigue curve equation are used in this study.

Numerical Simulation of Evaporative Air Cooler Based on Eulerian Wall Film Model of Two-Phase Flow

ZHANG Qing, WANG Xue-sheng, RUAN Wei-cheng, LIU Zi-long, CHEN Qin-zhu

Journal of East China University of Science and Technology (Natural Science Edition), 2018, 44(6): 928-934.

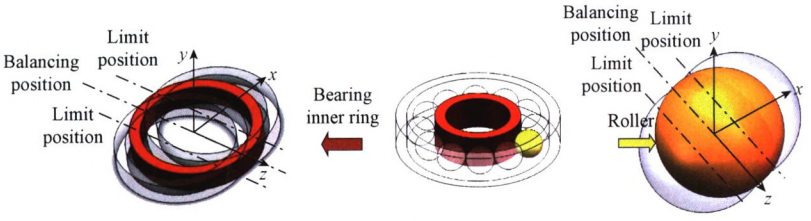


A three-dimensional model of eight rows wet air cooling plain tube bundle is established. And the mass source is applied to the tube surface to form liquid film based on the boundary condition of constant temperature. The Eulerian wall film model is coupled with the mixture species transport model to study the heat and mass transfer characteristics.

Calculation Method of Noise Produced by Rolling Elements and Inner Ring of Deep Groove Ball Bearing

ZHANG Qi-tao, AN Qi

Journal of East China University of Science and Technology (*Natural Science Edition*), 2018, 44(6): 935-944.



Taking deep groove ball bearing as the research object, the mechanical analysis is carried out. The noise calculation model for bearing is established, taking the bearing inner ring as the cylindrical sound source and the roller as the ball sound source. The influences of radial force and rotational speed on noise value are studied and discussed.

• Mathematics •

Some Examples of Kadison-Singer Algebras

YU Jia-qi, LI Jian-kui

Journal of East China University of Science and Technology (*Natural Science Edition*), 2018, 44(6): 945-949.

LM (0) XK → Pentagon → Kadison-Singer

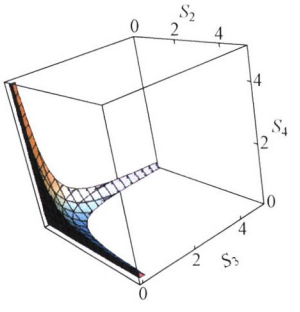
We construct a special pentagon subspace lattice with gap-dimension 1. The algebra corresponding to the pentagon subspace lattice is a semi-simple Kadison-Singer algebra. Besides, we give two examples of CSL algebras, which are not nest algebras. The first can be similar to a Kadison-Singer algebra, while the second never.

An Optimal Fractional Algorithm for Online Hierarchical Scheduling on Uniform Machines

ZHOU Peng-cheng, LIU Zhao-hui

Journal of East China University of Science and Technology (*Natural Science Edition*), 2018, 44(6): 950-954.

We study the parallel machine scheduling problem under a grade of service (GoS) provision where the jobs and the machines are both graded. We present an optimal algorithm for the problem with four hierarchies under certain conditions.

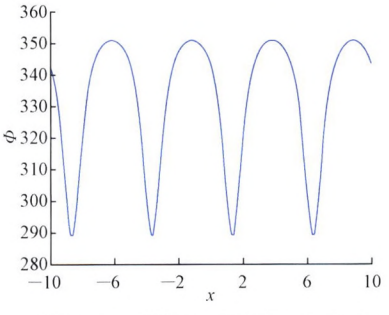


Bilinear Method for the Supersymmetric Variable Coefficient KdV Equation

DONG Chao, DENG Shu-fang

Journal of East China University of Science and Technology (*Natural Science Edition*), 2018, 44(6): 955-960.

The supersymmetric form of the variable coefficient Korteweg-de Vries (VCKdV) equation is given. Through variable transformation and bilinear method, the soliton solutions for the VCKdV equation are derived by Hirota method and Bäcklund transformation.



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