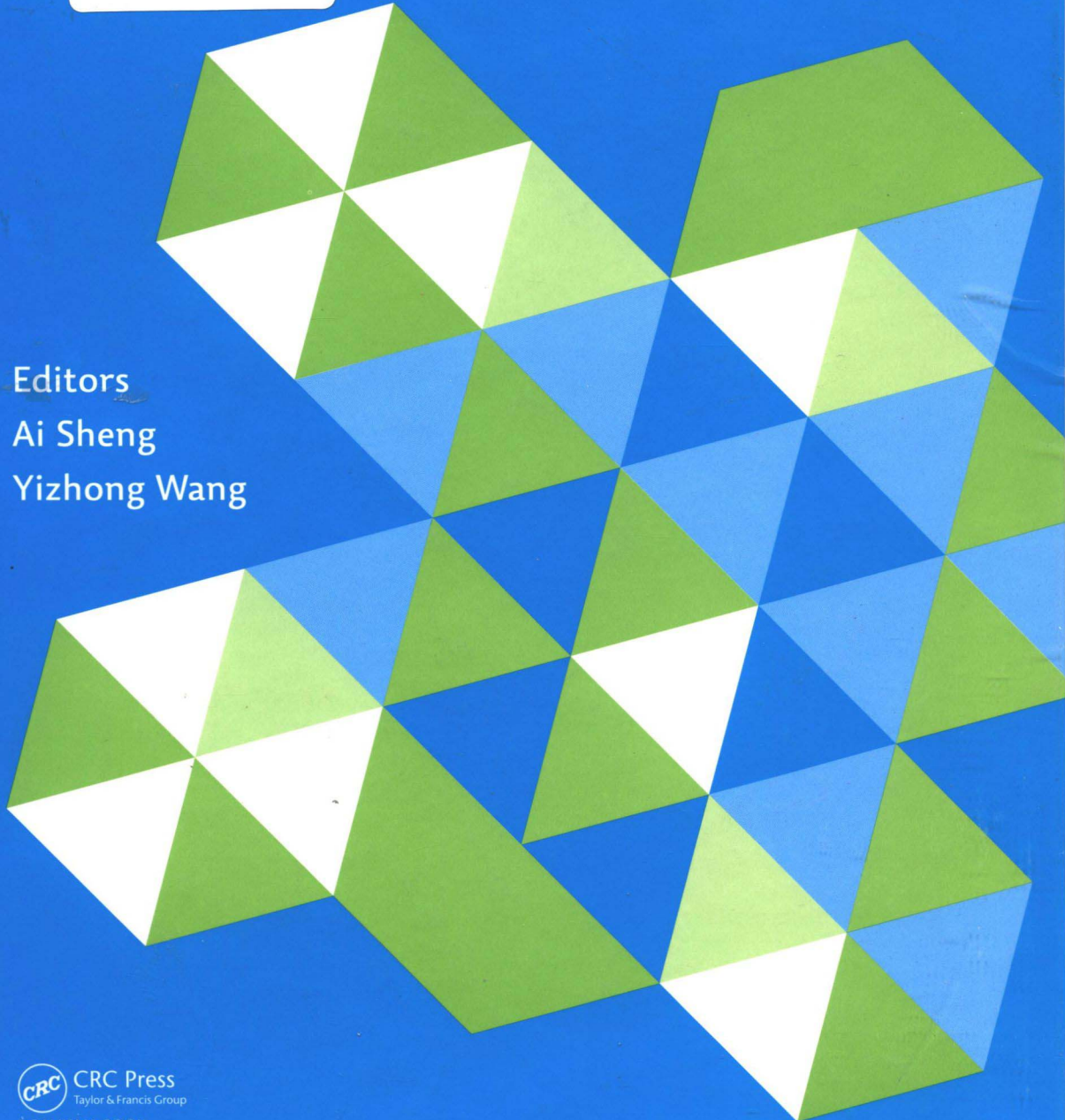


# MANUFACTURING AND ENGINEERING TECHNOLOGY

A large, abstract geometric pattern composed of numerous triangles in shades of green, blue, and white, arranged in a complex, interlocking design that covers the lower two-thirds of the book cover.

Editors

Ai Sheng

Yizhong Wang

PROCEEDINGS OF THE 2014 INTERNATIONAL CONFERENCE ON MANUFACTURING AND  
ENGINEERING TECHNOLOGY (ICMET 2014), SANYA, CHINA, 17–19 OCTOBER 2014

# Manufacturing and Engineering Technology

*Editors*

**Ai Sheng**

*Information Science and Engineering Technology Research Association (ISET),  
Hong Kong, China*

**Yizhong Wang**

*Tianjin University of Science and Technology, Tianjin, China*



**CRC Press**

Taylor & Francis Group

Boca Raton London New York Leiden

CRC Press is an imprint of the  
Taylor & Francis Group, an **informa** business

A BALKEMA BOOK

*CRC Press/Balkema is an imprint of the Taylor & Francis Group, an informa business*

© 2015 Taylor & Francis Group, London, UK

Typeset by V Publishing Solutions Pvt Ltd., Chennai, India

Printed and bound in Great Britain by CPI Group (UK) Ltd, Croydon, CR0 4YY

All rights reserved. No part of this publication or the information contained herein may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, by photocopying, recording or otherwise, without written prior permission from the publisher.

Although all care is taken to ensure integrity and the quality of this publication and the information herein, no responsibility is assumed by the publishers nor the author for any damage to the property or persons as a result of operation or use of this publication and/or the information contained herein.

Published by: CRC Press/Balkema

P.O. Box 11320, 2301 EH Leiden, The Netherlands

e-mail: [Pub.NL@taylorandfrancis.com](mailto:Pub.NL@taylorandfrancis.com)

[www.crcpress.com](http://www.crcpress.com) – [www.taylorandfrancis.com](http://www.taylorandfrancis.com)

ISBN: 978-1-138-02645-2 (Hbk)

ISBN: 978-1-315-76072-8 (eBook PDF)

MANUFACTURING AND ENGINEERING TECHNOLOGY



## Preface

The 2014 International Conference on Manufacturing and Engineering Technology (ICMET 2014) will be held in Sanya, Hainan, China during October 17–19, 2014. ICMET 2014 will provide a valuable opportunity for researchers, scholars and scientists together to exchange their new ideas and application experiences face to face, to establish business or research relations and to find global partners for future collaboration.

ICMET 2014 will be the most comprehensive conference focusing on Manufacturing and Engineering Technology. The papers in this book are selected from more than 500 papers submitted to the 2014 International Conference on Manufacturing and Engineering Technology (ICMET 2014). The book contributions cover 5 overall subjects: Mechanical Engineering and Manufacturing, Materials Science and Engineering, Industrial Engineering and Management, Control Engineering and Automation, and Information and Computer Engineering. The conference will promote the development of Manufacturing and Engineering Technology, strengthening the international academic cooperation and communications.

We would like to thank the conference chairs, the organizational staff, and the members of the International Technological Committees for their hard work. Thanks are also given to CRC Press/Balkema—Taylor & Francis Group.

We are looking forward to seeing all of you next year at ICMET 2015.

Yizhong Wang  
*Tianjin University of Science and Technology, China*



## ICMET 2014 committee

### ORGANIZER

Aisen, Information Science and Engineering Technology Research Association (ISET), *Hong Kong, China*

### CONFERENCE CO-CHAIRS

Aisen, Information Science and Engineering Technology Research Association (ISET), *Hong Kong, China*  
Yizhong Wang, *Professor, Tianjin University of Science and Technology, Tianjin, China*

### COMMITTEES

Jihe Zhou, *Professor, Chengdu Sport University, China*  
Hongmin Gao, *Professor, Beijing Institute of Technology, China*  
Chunguang Xu, *Professor, Beijing Institute of Technology, China*  
Haitao Li, *Professor, Southwest Petroleum University, China*  
Zhiming Liu, *Professor, Liao Ning Institute of Science and Technology, China*  
Shanglin Hou, *Professor, Lanzhou University of Technology, China*  
N.K. Sharma, *Professor, The Glocal University, India*  
Kanglin Wei, *Professor, Chongqing University, China*  
Je-Ee Ho, *Professor, I-Lan University, Taiwan*  
Chunpeng Li, *Professor, Quanzhou Normal University, China*





## Table of contents

Preface	xiii
ICMET 2014 committee	xv
Using an FPGA-based system for IEEE 1641 waveform generation <i>C. Liu &amp; C. Meng</i>	1
Analysis of GTM-AS rapier loom's rapier mechanism <i>J. Y. Xu</i>	5
Analysis of GTM-A rapier loom's take-up mechanism <i>J. Y. Xu</i>	9
Design of wireless communication platform of MCU based on Wi-Fi <i>M.-L. Wen, J.-C. Wang &amp; X. Wang</i>	13
The controlled blasting technology of sewage treatment pool concrete wall water hole in complicated environment <i>P. Huang, E.H. Wu, Q.S. Liu, S.L. Yang &amp; J. Li</i>	17
Research based on thermal shock in gear temperature field and stress field <i>D. Wang, G.H. Li, H.J. Zhang &amp; X.S. Ma</i>	21
Study on the setting and evaluation of left-turn waiting area at signalized intersections <i>B.Q. Sun &amp; J.Y. Chen</i>	27
Pretreatment of pineapple leaf fiber with Bu-gong tea saponin <i>J.H. Bai &amp; S.L. Cui</i>	33
Design of automatic vacuum casting machine <i>J. Wang &amp; J.F. Zhao</i>	39
Consider tooth surface forming error of spiral bevel gears parameterized modeling and modification technology research <i>Z.H. Zhou, K. Huang &amp; Y.S. Xiong</i>	43
A reliability allocation method for Weapon Systems based on multi-expert blur theory <i>X.-J. Wei &amp; J.-S. Xue</i>	49
Research on system reliability allocation based on BP neural network and improved algebraic method <i>J.-S. Xue, Y.-S. Zhang &amp; X.-J. Wei</i>	53
The design and realization of a user mode device driver framework <i>H.J. Bian, X.X. Zhao, J.H. Lei &amp; H.C. Ou</i>	57
The research on the planning strategy of rural environmental image improvement—taking Tiangongsi village of Baoding as an example <i>J.Y. Guo, Y.H. Wang &amp; L.N. Feng</i>	61
Trajectory optimization with multiple constraints for a guided bomb using a pseudospectral method <i>Y.B. Yuan &amp; K. Zhang</i>	67

The research and design of terminal data security in power system <i>W.W. Li, T. Zhang, Y.Y. Ma &amp; S. Deng</i>	73
Study on crash simulation and structure optimization of rear bumper of the truck <i>X.-N. Ye, W. Huang &amp; H.-C. Yuan</i>	77
Impact analysis of optimized rear bumper of the truck (mobile barrier 50% bias) <i>S.-L. Feng, X.-N. Ye &amp; Z.-Y. Zhang</i>	81
2DLDA based semi-supervised face recognition <i>W.-M. Shi &amp; X.-Y. Yang</i>	87
Reheating furnace model system based on Message-Oriented Middleware <i>L. He, K. Chen, H.L. Ke &amp; Y.H. Peng</i>	91
Research of the effects fabric performance for outside contour loose quantity of the fold collar <i>Y.N. Han &amp; Y. Liu</i>	95
Corrosion behavior of X80 pipeline steel in soil environment containing Sulfate-Reducing Bacteria <i>D. Wang, M. Wu, F. Xie, L. Ge, W.J. Zhang &amp; Y. Fu</i>	99
The application of torsion angle method in shaft dynamic torque measurement <i>X. Y. Zi, S. Geng &amp; S.F. Zhao</i>	105
The application of torque-sensitive materials in shaft dynamic torque measurement <i>X. Y. Zi, S. Geng, H. Wu &amp; S.F. Zhao</i>	111
Research on evaluation method of design schemes for customized product based on house of quality and its applications <i>Y.K. Ding, F.F. Zhu, W.Y. Shi &amp; X.S. Xu</i>	115
Research on the tungsten alloy long-rod penetrator penetrating concrete target <i>G.Y. Hang, W.L. Yu, T. Wang, J.T. Wang &amp; Z. Li</i>	121
The research of photocatalytic degradation of compound TiO <sub>2</sub> film in dyeing wastewater <i>L. Wang, C.S. Hao &amp; M.X. Li</i>	127
Effect of slag composition on inclusion transformation process for high-speed wheel steel during LF-VD process <i>Y. Tang</i>	131
The influence of line spacing and text background on visual search of web pages <i>N.N. Zhang &amp; D. Xu</i>	135
Study on pre-drainage seam gas technology with borehole drilled along seam in outburst and soft mine <i>Z.-L. Wang, Z.-L. Li &amp; A.-M. Liang</i>	139
Research on the master/slave model of the parallel processing technology for homogeneous multicore DSP <i>M.J. Wu, H. Y. Zhao, S. Y. Xie, W.W. Wu, X.F. Zhang &amp; N.C. Yuan</i>	143
Research key technologies of the current network security situation awareness <i>X.J. Guan, T. Zhang, Y.Y. Ma &amp; S. Deng</i>	149
Study on the data mining method of vehicle insurance based on a rough set <i>H. Che, J. Cheng &amp; W.P. Ding</i>	155
Assessment for the fire risk of the underground parking area <i>H. Che, W.P. Ding &amp; J. Cheng</i>	159
Deep-hole precision processing method of pin bush <i>H.H. Chen, Q.T. Wu, F.M. Nie, B.G. Hu &amp; Z. Kang</i>	163
Workflow-based airworthiness certification document flow and its management system <i>X.B. Yan, J.J. Jiang, J.B. Wang &amp; Y.M. Cao</i>	169

Influence of fit tolerance between square tenon thickness and oval mortise width on ultimate pulling resistance <i>M. Chen, Y.-Q. Yang, X. Wu &amp; J.-H. Lyu</i>	175
Influence of fit tolerance between tenon width and mortise length on joint performance of oval-tenon manufactured by <i>Alnus formosana</i> wood <i>M. Chen, Z.-G. Cai, Y.-Q. Yang &amp; J.-H. Lyu</i>	181
Air flow noise analysis for the intake manifold based on CFD <i>P.H. Huang, J.C. Zhang &amp; B. Feng</i>	187
Probabilistic design of spherical function mechanisms <i>A.P. Zhuang, J.F. Zhang, J.M. Liao &amp; Y.J. Li</i>	191
An indirect measurement method of volumetric errors for linear axes in CNC machine tools <i>J.W. Fan, Y.H. Tang &amp; Y. Song</i>	197
CPOM to synthesis gas by ceria-promoted nickel nanowire catalyst <i>X.-B. Hong</i>	203
Research and development of a multiple data source curve drawing software for IC equipment <i>N. Jin, A.D. Xu, M.Z. Liu, K. Wang &amp; C.X. Wang</i>	209
Analysis and calculation for LV auxiliary power system short-circuit current of the fossil fuel power plant <i>H. Y. He, Z.H. Wang &amp; N. Jin</i>	213
An open-source musculoskeletal model for lumbar force predictions <i>X.J. Meng, D.E. Anderson, A.G. Bruno, W.J. Wang, M.L. Bouxsein, S.B. Li &amp; B. Cheng</i>	217
Improvement of the algorithm in addition to optimize the canal with the application <i>L.L. Deng &amp; X. Zhang</i>	223
Thermal analysis of a power box <i>B. Chen &amp; N. Li</i>	227
FA used in the development of the vending machine with the function of returning changes <i>W. Wang &amp; H. Gu</i>	231
Research on the cost driver selection and combination in Activity-Based Costing <i>Q. Y. Cui, X.R. Dong &amp; Y.Z. Ma</i>	237
First-principle simulations of quantum transport for a nanoscale InAs device <i>L. Y. Zhang, L. Fang, N. Xu &amp; H.H. Sun</i>	241
Application and realization of remote control in power ultrasonic treatment <i>Y.G. Kong, Y.Z. Yang &amp; M.D. Luo</i>	245
A novel method for deriving reservoir operation curves based on the concept of dynamic variable sampling space <i>X. Wang, X.N. Guo, X. Chen, X.H. Lei, Y.Z. Jiang &amp; H. Wang</i>	249
IETM data in the comprehensive utilization of equipment life cycle <i>J. Zhang, H. Y. Zhao &amp; J.Q. Zhang</i>	255
Research on the PV-Storage-Charging station method base on graph theory <i>J. Yu, H. Ge &amp; H.G. Wang</i>	259
Analysis of vibration characteristics of a ball screw system <i>J.J. Yang &amp; Q. Wu</i>	263
Design of a multiplexing Pulse Power Source control system based on the CAN bus <i>X. Zhang &amp; Z. Zhang</i>	267
Research on discrete bipolar switching effect in memristor device <i>Z.-S. Tang, N. Xu, R.-L. Liu, Y.-Q. Chi &amp; L. Fang</i>	273

Modification of the analytical model for drag bits in rotary rock drilling <i>Z.T. Li, Y.Z. Ma, L. Yin, F.X. Li &amp; F. Jin</i>	277
Influence of titanium on hot-dip 55% Al–Zn alloy coating <i>T.X. Guo, C.S. Liu &amp; Y.L. Zhou</i>	283
Designing and testing the control circuit for the base current of SiC transistors <i>T. Jing &amp; H.B. Wang</i>	287
Management of the food supply chain-based networking technology <i>H.B. Wang</i>	291
Research of a cold-chain logistics security monitoring platform based on Internet of things <i>H.B. Wang &amp; T. Jing</i>	295
The study of the impact of RMB appreciation on China's service trade and the dealings of the enterprise's strategies <i>Q.C. Wu</i>	299
The study of the causes of the impact of RMB appreciation on service export <i>Q.C. Wu</i>	303
Gray correlation of China's logistics capability and the growth of agriculture economy <i>X.M. Liu &amp; Z.H. Ouyang</i>	309
Diploma of patriarch-based management in Quanzhou's industry transformation and upgrading, and the analysis of its strategies <i>S.F. Huang</i>	313
E-commerce development strategy and platform establishment for the agricultural products of Quanzhou city <i>W.C. Hong</i>	317
Quanzhou rural tourism development model and marketing strategy analysis <i>C.P. Li</i>	323
Econometric analysis on the relationship between regional logistics and industrial structure's changes in Fujian province of China <i>S.B. Yan</i>	327
Study on the relationship between the economic growth and environmental pollution in Fujian province based on the VAR model <i>X.Z. Xu</i>	333
Analysis of online consumer's shopping behavior <i>Y.Y. Wang</i>	339
The comparison and evaluation on the regional scientific and technological innovation efficiency in Fujian province of China <i>T.E. Su</i>	343
Business model analysis of bank online store <i>C.P. Li</i>	349
Target detection and tracking based on digital image <i>J.X. Wang, Y.L. Wang &amp; H.B. Kang</i>	353
Research and implementation of retrieval technology based on image content <i>J.X. Wang, Y.L. Wang &amp; H.Y. Sun</i>	357
Hybrid ring coupler with arbitrary power division using phase inverters <i>N. Zhang, C.-L. Zhong, X.-H. Xu &amp; Y.-P. Sun</i>	361
Research on developing a log system based on .Net <i>Y.-L. Liu, Y.-H. Liu, X. Wang, Y.-B. Zhang &amp; X.-Z. Cheng</i>	367
Kinematic analysis of a deployable mast used for solar cell arrays <i>H.Y. Tan, Y.J. Hu, L. Ling &amp; J.L. Li</i>	371

Research on the genetic algorithm-based all-terminal network optimization <i>G.Z. Zou &amp; X.L. Huang</i>	377
Evaluation of an equipment operation maintenance plan based on the AHP and entropy weight methods <i>T.P. Li, Y.L. Qian &amp; Y. Li</i>	381
A new guidance method for reentry warhead against a stationary target <i>Z.D. Hu, X.M. Tang, F.Y. Zhou &amp; Z.J. Li</i>	387
Magnetorheological elastomer damper design and finite-element analysis <i>W.J. Xu, Z. Ren, J.Y. Wang, T.S. Zhang, C. Zhao &amp; C.R. Tang</i>	393
Research on a new cloud trust model and its defense abilities <i>M.H. Yang, Z.P. Wang &amp; J.J. Yao</i>	399
A secure data access method based on eID for mobile Internet <i>M.H. Yang, J.J. Yao &amp; Z.X. Liu</i>	405
Research on security access control method of power intranet terminal <i>L. Chen, X. Liu &amp; S. Deng</i>	409
An on-line monitoring system for the determination of ammonium nitrogen in waters <i>K.-L. Wei &amp; Q. Fang</i>	413
Research on calculation of thermal electromotive force of second-class Pt-Rh 10%-Pt thermocouple on 100 temperature points based on LabVIEW <i>B. Zhou, J.H. Zhao, Y.K. Wei &amp; D.D. Li</i>	417
Competitive dynamic I-Ching decision model—solar battery industry in Taiwan <i>W. Pei &amp; K.-H. Lin</i>	421
Thermal effects of various conductive thin films deposited on flexible substrates <i>F.Y. Chen, M.J. Kuo &amp; R.C. Chang</i>	427
Preservative effects of antimicrobial controlled-release coatings containing Tea Polyphenol nanoparticles on tilapia fillets <i>H. Wang, Z.H. Huang, R. Hu &amp; J.Y. He</i>	433
Stress analysis and injury research of human thorax tissues during vehicle rear impacts <i>D.W. Cheng &amp; Q. Xue</i>	439
Research on Y-shaped elastomeric reciprocating seal lubrication conditions based on numerical calculation <i>B. Hong &amp; F.Y. Zhang</i>	443
Residual stresses effects of transparently conductive thin films deposited on flexible substrates <i>M.J. Kuo, F.Y. Chen &amp; R.C. Chang</i>	449
Development of an ice shape non-contact measuring system based on 3D scanning technology <i>L. Guo, J. Ma &amp; M. Li</i>	455
The feedback and correction of classification model for cold strips surface defects based on the immune algorithm <i>T. Shi, J.Y. Kong, X.D. Wang, J.W. Liu &amp; Z. Liu</i>	461
Research on nonlinear polynomial least square error compensation based on method DEWE 2010 <i>C. He, G.L. Dong, Q. Li &amp; M.Y. Ye</i>	467
An efficient distance metric for time series data mining <i>Y.-Q. Shi &amp; Y.-L. Zhu</i>	471
Research on the damping characteristics optimization of the tracked vehicle <i>Y.J. Chen, M.X. Hou, Y.F. Zhang, H.J. Ju &amp; X.L. Han</i>	475
Rubber chemicals wastewater treatment technology research <i>X. Bian, W. Hong, X. Tan, F. Ma, X.F. Zou &amp; W. Zhao</i>	481

Research on three-dimensional measurement of wind tunnel model based on Kinect <i>W.M. Zhao, L. Liang, L.J. Zhang &amp; Y. Cheng</i>	485
Preparation of metallographic specimen of commercial pure titanium used for surgical implants <i>M. Chang &amp; J. Su</i>	491
Practical studies on a central solar heating system with high efficiency <i>Y.W. Li, Y.X. Jiang, L.L. Zhao &amp; J.Y. Li</i>	493
Research on spillage refinement algorithm of 70,000 tons tanker based on damage probability <i>J.N. Zhang, M.Y. Jing, M.X. Jin &amp; L. Zhang</i>	497
Research on some Thermal Weapon Sights signal acquisition technology <i>N. Li, T.C. Huang &amp; R.X. Duan</i>	501
The formation mechanism and control measures of leakage defects on the cast aluminum heat exchanger <i>R.H. Zhang, D.X. Ma, S.C. Sun &amp; J.Z. Mao</i>	505
Optimizing an intake manifold shape for better function <i>P. Zhou, W.-H. Qian, L. Liu, X.-J. Hu &amp; J. Luo</i>	509
The study of the road deceleration strip <i>J.B. She, J. Liu, Y.Z. Xu &amp; Y. Wang</i>	515
Crowdsourcing for early provisioning of road-disruption information: Model and implementation <i>T. Dirgahayu, B.K. Widodo &amp; R.U.M. Akbar</i>	519
A study on effective implementation of staff rotation system in a state-owned enterprise <i>X.M. Long, Y.Y. Tian &amp; H.M. Shen</i>	525
Research on cylindrical equipment launch process parameters simulation <i>H. Chen, Z.H. Kong, X. Wang &amp; K. Zhang</i>	529
Design of mobile phone bluetooth remote control light switch <i>F. Hou</i>	535
A review of firm's low carbon capability <i>T. Yang &amp; S.C. Li</i>	539
Light trapping effect of aluminum back reflector on stainless steel substrate for a-Si solar cell <i>T.-C. Li, H. Ay, Y.J. Ciou, C.F. Ai, J.D. Jun, M.C. Wang &amp; T.K. Tsai</i>	543
A study on modeling of underwater FCAW process based on MATLAB <i>H. Wang &amp; B. Chen</i>	549
Fabrication and characterizations of electrosark coating on aluminum alloy substrate <i>F. Guo, J.Z. Hao &amp; P. Li</i>	553
Cause analysis of the high logistics cost in China and relevant suggestions <i>N. Dong</i>	557
The development strategy of Chinese road freight enterprise under new circumstance <i>J. Wang, C.L. Jiang, N. Dong &amp; Y.F. Li</i>	561
The higher order crack tip fields for anti-plane crack in power functionally graded piezoelectric materials <i>Y. Dai, X. Chong &amp; J.C. Huang</i>	565
The higher order crack tip fields for arbitrarily oriented crack with the physical weak-discontinuity <i>Y. Dai, X. Chong &amp; J.W. Pan</i>	569
A simulation model of spare inventory with complex conditions <i>J.M. Zhao, Q.W. Hu &amp; Y. Tian</i>	573

An aggregate-function-based filled function method for constrained global optimization <i>W. Liu</i>	577
The simulation model for research of island operation control strategy in HVDC weak sending-end system <i>Y.D. Song, Q. Zhang, J.S. Liu, J.Y. Zhang, W. Fan, L. Y. Yang, F.W. Duan &amp; C.F. Zhao</i>	583
Parametric screening and design refinement of ceiling fan blades <i>S. Ahmad, R. Ahmad &amp; A. Maqsood</i>	591
Prediction of thermophysical properties of hydrogen via linear prediction and Artificial Neural Networks <i>S.J. Yang &amp; J.Y. Wang</i>	597
Research on the development process, existing problems and countermeasures of organization system, management mechanism, and law system of emergency management of mega city in China—taking Shanghai as an example <i>X.-L. Yan</i>	603
The affection of the dip angle changing to the meridional velocity distribution for variable-obliquity inducer <i>R.-N. Li, Y.-X. Deng, W. Han, Z. Li &amp; D.-W. Wang</i>	609
Designed Textile Reinforced Concrete elements for architectural facade applications <i>K. Pidun &amp; M. Schulze</i>	613
Author index	617



