

Songling Huang



Professor

Director of Oil Field Electrical Engineering Center, Tsinghua University
Vice dean of Institute of Advanced Electrotechnology, Department of Electrical Engineering, Tsinghua University

Nondestructive testing and evaluation, Oil and gas pipeline defect in-line inspection, Magnetic flux leakage testing, Electromagnetic ultrasonic guided wave testing, Eddy current testing

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Biography

Songling Huang has been appointed Professor of Electrical Engineering Department of Tsinghua University since 2010. He holds Bachelor's degree of Testing Technology and Instruments in 1991 from Southeast University and a Ph.D in Mechanical Engineering from Tsinghua University in 2001. He is the Director of Oil Field Electrical Engineering Center in Tsinghua University. His research interests include nondestructive testing and evaluation, oil and gas pipeline defects in-line testing, magnetic flux leakage testing, electromagnetic ultrasonic guided wave testing, and eddy current testing. He has been the PI of more than 30 academic and industrial projects. He is the author of 5 books on nondestructive testing and evaluation. He has been authorized 20 invention patents. He has won 11 awards at provincial and ministry level and from Societies. He serves as the Editorial Board Member of 4 international and Chinese peer-reviewed Journals.

Educational Background

- 1995-2001, Ph.D, Nondestructive testing, Tsinghua University, China
- 1987-1991, Bachelor of Eng., Electrical Engineering, Southeast University, China

Work Experience

- Oct, 2009- present, Director of Oil Field Electrical Engineering Center, Tsinghua University
- Mar, 2008-present, Vice dean of Institute of Advanced Electrotechnology, Department of Electrical Engineering, Tsinghua University
- Dec, 2010-present, Professor, Department of Electrical Engineering, Tsinghua University, Beijing, China
- Dec, 2005-Nov, 2010, Associate Professor, Department of Electrical Engineering, Tsinghua University, Beijing, China

- Sept, 2003-Nov, 2005, Lecturer, Department of Electrical Engineering, Tsinghua University, Beijing, China
- Aug, 2001-Aug, 2003, Lecturer, Department of Mechanical Engineering, Tsinghua University, Beijing, China
- Jul, 1991-Aug, 1995, Lecturer, Department of Electrical Engineering, Shenyang Institute of Technology, Shenyang, China

Honors and Awards

(1) Research Awards

- The first prize, Beijing City Science and Technology Award, for the project of “the Key Technologies of Oil and Gas Pipelines Defects in-line Inspection and Applications”, 2014
- The recognition award, State Intellectual Property Office, Prize for Patent, for the patent of “Defect Identification and Quantification Assessment Method Based on Three-dimensional Finite Element Neural Network”, 2014
- The second prize, National Ministry of Education, Prize for Technological Invention, for the project of “Research on the Key Technologies of Oil Pipelines and Tank Floor Defects Inspection and Applications”, 2013
- The first prize, China Association for the Advancement of Industry University Research Cooperation, Prize for China Industry University Research Cooperative Innovation Achievement, for the project of “Oil and gas pipeline defect detection system”, 2013
- The second prize, State Grid of China, Prize for Progress in Science and Technology, for the project of “Large Current Transformer Magnetic Shielding Protection and Detection Technology”, 2010
- Scientific Technology Progress Prize of Petrochemical Industry , 2009
- The first prize, China Petrochemical Association of Automation Applications, Prize for Progress in Science and Technology, for the project of “Development and Application of High Definition Storage Tank Floor Defects Inspection Equipment”, 2009
- The second prize, National Ministry of Education, Prize for Progress in Science and Technology, for the project of “High Definition Storage Tank Floor Defects Visual Inspection Equipment”, 2009

(2) Teaching Awards

- First Prize of Tsinghua University Teaching Achievements, 2014

Professional Activity

(1) Professional Society Membership

- Member of IEEE
- Member of IET
- Senior Member of Chinese Instrument Society
- Senior Member of Mechanical Engineering Society of China
- Member of American Society of NDT
- Member of Chinese Society of NDT
- Member of Nondestructive Testing Instrument Standardization Committee of China
- Member of NDT Education, Training and Science Popularization Committee of China
- External Engaged Expert of Petroleum Pipeline Bureau of China
- Member of NDT Standardization Committee of China

(2) Editorship in International Journals

- Editorial Board Member, Frontiers in Sensors, Science and Engineering Publishing Company(USA)
- Editorial Board Member, Journal of Sensor Technology, Scientific Research(USA)

(3) Editorship in Chinese Journals

- Editorial Board Member, Nondestructive Testing(China)
- Editorial Board Member, China Measurement and Test (China)

(4) Chair and Technical Committee of Conference

Chair of Conference

- Co-Chair, The 3rd World Conference on Safety of Oil and Gas Industry 2010, 27 – 29 September, 2010, Beijing, China

Member of Technical Program Committee / International Advisory Committee/Organizing Committee

- The International Conference on Sensors and Network (ICSN2015), April 25 to 26, 2015 in Beijing, China
- 19th International Workshop on Electromagnetic Nondestructive Evaluation(ENDE2014), June 25 to 28, 2014 in Xi'an, China
- The 2nd China-Korea Symposium on Nondestructive Testing, June 23 to 24, 2014 in Beijing, China
- IEEE TENCON 2012, November 19 to 23, 2012 in Cebu City, Philippines
- The 2nd International Conference on Structural Health Monitoring and Integrity Management(ICSHMIM2014), September 24 to 26, 2014 in Nanjing, China
- The 1st International Conference on Structural Health Monitoring and Integrity Management (ICSHMIM2012), November 25 to 28, 2012 in Beijing, China

Research

(1) Research Interests

- Nondestructive testing and evaluation
- Oil and gas pipeline defect in-line inspection
- Magnetic flux leakage testing
- Electromagnetic ultrasonic guided wave testing
- Eddy current testing

(2) Selected Academic Funds

- 2013-2018, Development of 3D MFL imaging detector of defects of ferromagnetic materials. the National Key Scientific Instrument Development Projects (PI)
- 2011-2015, The Development of oil & gas pipeline corrosion inspection tools. The National High-Tech Research and Development Program(863) of China, Ministry of Science and Technology. (PI)
- 2013-2016, Study of active defects testing of high-speed railway roadbed. National Natural Science Foundation of China (PI)
- 2011-2014, Research on offshore pipelines defects testing. Ministry of Education (PI)
- 2010-2012, Study of EMAT-generated ultrasonic guided wave focusing inspection method used for oil and gas pipeline defect detection. National Natural Science Foundation of China (PI)
- 2009-2011, Research on high speed railway steel rail flaw detection method based on electromagnetic ultrasonic guided wave. Ministry of Education (PI)
- 2009-2010, Study of EMAT ultrasonic guided wave inspection method used for power station pipeline defect detection. State Key Lab of Power Systems. (PI)
- 2008-2010, The development of oil & gas pipeline crack inspection tools. Key Projects in the National Science & Technology Pillar Program during the Eleventh Five-Year Plan Period(PI)

- 2007-2009, Research of oil & gas pipeline crack inspection. The National High-Tech Research and Development Program(863) of China, Ministry of Science and Technology. (PI)
- 2004-2006, Study of active defects testing and its physical mechanism. National Natural Science Foundation of China (PI)

(3) Selected International Collaboration Projects

- 2015, Real time laser condition monitoring system for wind turbine shaft, The Royal Academy of Engineering -Newton Research Collaboration Programme Award, University of Durham and Tsinghua University, (PI on China side)
- 2014-2016, 10" oil and gas pipeline defects inner inspector, APC Group, (PI on China side)
- 2007-2008, The temperature distribution measurement of motor rotor, Mitsubishi Heavy Industries,Ltd, (PI on China side)

(4) Selected Industry Projects

- 2013-2014, IDOD probe of oil & gas pipeline defects inspection tools. Beijing Huahang Radio Measurement Research Institute (PI)
- 2013, 6" oil and gas pipeline defects inner inspector. Sinopec Group (PI)
- 2013, Research on the vibration and noise reduction technology of power transformer. Changzhou Xidian Transformer Co., Ltd. (PI)
- 2010-2012, Oil & gas pipeline crack EMAT inspection tools. China National Petroleum Corporation (PI)
- 2010-2012, Oil & gas pipeline defects EMAT guided wave inspection equipment and pipeline evaluation. Sinopec Group (PI)
- 2010-2011, Three-axial MFL oil & gas pipeline inspection tools. China National Petroleum Corporation (PI)
- 2009-2012, The development of oil & gas pipeline corrosion MFL(Magnetic Flux Leakage) inspection tools. Sinopec Group (PI)
- 2007-2009, Oil & gas pipeline MFL inspection tools. China National Petroleum Corporation (PI)
- 2006, Tank floor defects inspector. China National Petroleum Corporation (PI)
- 2006, Research on oil and gas crack inspection. China National Petroleum Corporation (PI)
- 2004-2005, Bypass of high resolution oil & gas pipeline inspection tools. China National Petroleum Corporation (PI)
- 2003-2005, Data analysis expert system for oil & gas pipeline inspection. China National Petroleum Corporation (PI)
- 2003-2005, Data analysis software of oil & gas pipeline inspection tools. China National Petroleum Corporation (PI)

Publications and Patents

Prof. Songling Huang is the author of 5 books. He has published more than 200 papers and has been authorized 21 patents.

(1) Books

- **Huang Songling.** Novel Electromagnetic Nondestructive Testing Technology, Tsinghua University Press, January 2014
- **Huang Songling,** Zhao Wei, Wang Shen. Theory and Application of Electromagnetic Ultrasonic Guided Wave, Tsinghua University Press, October 2013
- **Huang Songling.** Theory and Application of Oil and Gas Pipeline MFL Inner Inspection, Machinery Industry Press, September 2013

- Zhao Wei, **Huang Songling**, Hu Yifei, Shao Haiming, Wang Xue. China Electrical Engineering Ceremony, V1Ch4, China Electric Power Press, January 2009

(2) Textbook

- **Huang Songling**, Wu Jing, Fundamentals of Virtual Instruments Design, Tsinghua University Press, September 2008

(3) Selected International Journal Papers Since 2010

- 1) Yu Zhang, Shen Wang, **Songling Huang**, Wei Zhao. Mode Recognition of Lamb Wave Detecting Signals in Metal Plate Using the Hilbert-Huang Transform Method. *Journal of Sensor Technology*, v5n2 p7-14, March, 2015
- 2) Shen Wang, **Songling Huang**, Wei Zhao, Zheng Wei. 3D modeling of circumferential SH guided waves in pipeline for axial cracking detection in ILI tools. *Ultrasonics*, v56n2 p325-331, March, 2015
- 3) Junjie Chen, **Songling Huang**, and Wei Zhao. Equivalent MFL Model of Pipelines for 3-D Defect Reconstruction Using Simulated Annealing Inversion Procedure. *International Journal of Applied Electromagnetics and Mechanics*, v47n15 p551-561, 2015
- 4) **Songling Huang**, Zheng Wei, Wei Zhao, et al. A New Omni-Directional EMAT for Ultrasonic Lamb Wave Tomography Imaging of Metallic Plate Defects. *Sensors*, v 14 n2 p 3458-3476, February, 2014
- 5) **Songling Huang**, Zheng Wei, Wei Zhao, et al. A Large Ratio Data Compression Method for Pipeline inspection based on EMAT-generated Guided Wave. *International Journal of Applied Electromagnetics and Mechanics*, v 45n14 p511-517, 2014
- 6) Junjie Chen, **Songling Huang**, Wei Zhao and Shen Wang. Reconstruction of 3-D defect profiles from MFL signals using radial wavelet basis function neural network. *International Journal of Applied Electromagnetics and Mechanics*, v45n14 p465-471, 2014
- 7) Junjie Chen, **Songling Huang**, and Wei Zhao. Three-dimensional Defect Reconstruction from Magnetic Flux Leakage Signals in Pipeline Inspection based on a Dynamic Taboo Search Procedure. *Insight-Non-Destructive Testing and Condition Monitoring*, v56n10 p535-540, 2014
- 8) Junjie Chen, **Songling Huang**, and Wei Zhao. Three-dimensional defect inversion from magnetic flux leakage signals using iterative neural network. *IET Science, Measurement and Technology*. DOI: 10.1049/iet-smt.2014.0173.
- 9) **Songling Huang**, Furong Zhu, Hongxiu Zhu, Wei Zhao and Shen Wang. The development of rock failure electromagnetic emission monitoring system. *Applied Mechanics and Materials*, v330 p401-406, 2013
- 10) Kuansheng Hao, **Songling Huang**, Wei Zhao, Shen Wang, Jiarui Dong. Analytical modeling and calculation of pulsed eddy current and input impedance for EMATs with planar spiral coils. *NDT & E International*, v44n3 p274-280, 2011
- 11) Shen Wang, **Songling Huang**, Wei Zhao. Simulation of Lamb waves interactions with transverse internal defects in an elastic plate. *Ultrasonics*, v51n4 p432-440, 2011
- 12) Shao Mingsong, **Huang Songling**, Zhao Wei, Dong Jiarui and Wang Changquan. Design of Easier Controllable High Efficiency Electrodeless Ballast. *Applied Mechanics and Materials*, v48 p382-386, 2011
- 13) Xu Peng, **Huang Songling** and Zhao Wei. A new differential eddy current testing sensor used for detecting crack extension direction. *NDT and E International*, v44n4 p339-343, 2011
- 14) **Huang Songling**, Tong Yun, Zhao Wei. A denoising algorithm for an electromagnetic acoustic transducer (EMAT) signal by envelope regulation. *Measurement Science & Technology*, v21n8, 2010
- 15) Shen Wang, **Songling Huang**, Wei Zhao, Xue Wang. Approach to Lamb wave lateral crack quantification in elastic plate based on reflection and transmission coefficients surfaces. *Research in Nondestructive Evaluation*, v21n4 p 213-223, 2010

(4) Selected Conference Papers Since 2010

- 1) Junjie Chen, **Songling Huang**, and Wei Zhao. Three-axial MFL inspection in pipelines for defect imaging using a dynamic inversion procedure. the 10th European Conference on Magnetic Sensors and Actuators. July 6-9, 2014, Vienna, Austria: 242.
- 2) Zhen Wei, **Songling Huang**, Shen Wang and Wei Zhao. Magnetostriction-Based Omni-Directional Guided Wave Transducer for Tomography of Steel Plate Defects. the 10th European Conference on Magnetic Sensors and Actuators. July 6-9, 2014, Vienna, Austria: 268.
- 3) Xinmeng Liu, **Songling Huang**, Wei Zhao and Shen Wang. Slowly Varying Defects Reconstruction from MFL Signals Using BP Neural Network Based on Bayesian Algorithm. the 10th European Conference on Magnetic Sensors and Actuators. July 6-9, 2014, Vienna, Austria:242
- 4) Mingsong Shao, **Songling Huang**, Wei Zhao. Nonlinear Analysis of a Family of High-Frequency Self-Oscillating Resonant Inverters, the 28th Annual IEEE Applied Power Electronics Conference & Exposition, March 17-21, 2013: 2349-2354., Long Beach, California,USA
- 5) Zhu Furong, Zhu Hongxiu, Wei Zheng, **Huang Songling**. The development of rock failure electromagnetic emission monitoring system. The 1st International Conference on Structural Health Monitoring and Integrity Management. November 25-28, 2012, Beijing,China :81-84.
- 6) Zhiyi Su, **Songling Huang**, Wei Zhao, Shen Wang, Huacheng Feng. Development of a Portable High-Precision Above Ground Marker System for an MFL Pipeline Inspector. 18th World Conference on Non Destructive Testing, April 16-20, 2012, Durban, South Africa.
- 7) Mingsong Shao, **Songling Huang**, Wei Zhao and Changquan Wang. Soft-switching Analysis of a Resonant Capacitor Current Feedback Self-oscillating Inverter. 2012 IEEE 7th International Power Electronics and Motion Control Conference, June 2-5, 2012, Harbin, China:1690-1694
- 8) Hao Kuansheng, **Huang Songling**, Zhao Wei, DUAN Rujiao. Analytical calculation and analysis for meander-coil electromagnetic acoustic transducers. 2011 IEEE International Instrumentation and Measurement Technology Conference, I2MTC 2011 – Proceedings: 231-234. EI: 20113414256304
- 9) Peng Xu, Songling Huang, Wei Zhao. Differential Eddy Current Testing Sensor Composed of Double Gradient Winding Coils for Crack Detection. 2010 IEEE Sensors Applications Symposium Proceedings, Limerick, Ireland, 2010:59-63
- 10) Hao Kuansheng, **Huang Songling**, Zhao Wei, Wei Zheng, Wang Shen, Huang Zijing. A new frequency-tuned longitudinal wave transducer for nondestructive inspection of pipes based on magnetostrictive effect. 2010 IEEE Sensors Applications Symposium Proceedings, Limerick, Ireland, 2010:64-68
- 11) Wang Shen, **Huang Songling**, Zhao Wei and Tian Guiyun. Alternating Winding Magnetostrictive Electromagnetic Acoustic Transducer for Pipe Torsional Guided Wave Generation. 2010 IEEE Sensors Applications Symposium Proceedings, Limerick, Ireland, 2010:69-72
- 12) **Songling Huang**, Shen Wang, Wei Zhao, Jiarui Dong, Kuansheng Hao. Study on Oil and Gas Pipeline Crack Detection Method Based on Emat-Generated Ultrasonic Guided Waves. The 3rd World Conference on Safety of Oil and Gas Industry(WCOGI) Beijing, China, 2010:491-493

(5) Selected Chinese Journal Papers since 2010

- 1) Qun Liu, **Songling Huang**,Wei Zhao, Junjie Chen. Design of Data Acquisition System for Submarine Pipeline Magnetic Flux Leakage Detector. China Measurement & Test, v 41,n 1,p 89-92, January, 2015
- 2) Xinmeng Liu, Wei Zhao, **Songling Huang**. Reconstruction of Horizontal Groove Defects on Tank Floor From Three-axial MFL Signals. Electrical Measurement & Instrumentation, v 51,n 16, August, 2014
- 3) Hengjing He, Wei Zhao, **Songling Huang**. Research on the Instrumentation Virtualization in Cloud Computing Environment. Electrical Measurement & Instrumentation, v 51,n 16, p 11-16, August, 2014
- 4) Junjie Chen, **Songling Huang**, Wei Zhao. Research on Data Compression Algorithm of MFL Detection for Oil and Gas Pipelines. Electrical Measurement & Instrumentation, v 51,n 15,p 100-104, August, 2014
- 5) Mingsong Shao, **Songling Huang**, Wei Zhao. Modeling and Analysis of Electrodeless Lamp System. Transactions of China Electrotechnical Society, v 28, n 4, p 13-19, April, 2013

- 6) Mingsong Shao, **Songling Huang**, Wei Zhao. Measurement and Analysis of the Steady-state Impedance Characteristics of High-frequency Electrodeless Lamp. *High Voltage Engineering*, v 39, n 4, p 923-927, April, 2013
- 7) Mingsong Shao, **Songling Huang**, Wei Zhao, Bin Zhu, Jiarui Dong. Modeling and Analysis of Self-oscillating Structure of Electronic Ballast. *Chinese Journal of Power Sources*, v 37, n 12, p2200-2202, December, 2013
- 8) Jin Xing, Bo Jiang, Wei Zhao, **Songling Huang**. Numerical Simulation Analysis on Core Structure Optimization of Heavy Protective Current. *Electrical Measurement & Instrumentation*, v 50, n 5, p 1-4, May, 2013
- 9) Zheng Wei, **Songling Huang**, Wei Zhao, Shen Wang. Development of the Ultrasonic Guided Wave Detecting System for Pipeline Based on the Magnetostrictive Effect. *Electrical Measurement & Instrumentation*, v 50, n 9, p 21-25, September, 2013
- 10) Zhiyi Su, Wei Zhao, **Songling Huang**. The Status and Importance of Multi-Sensor Information Fusion in the Field of Modern Measuring. *Electrical Measurement & Instrumentation*, v 50, n 3, p 1-5, March, 2013
- 11) Zhiyi Su, Wei Zhao, **Songling Huang**, Shen Wang, Huacheng Feng. Development of Portable High-precision Above Ground Marker System for an MFL Pipeline Inspector. *Nondestructive Testing*, v 34, n 10, p 16-18, October, 2012
- 12) Yuhang Su, Jing Wu, Huacheng Feng, **Songling Huang**. Portable Pipeline Pig Localization System. *Nondestructive Testing*, v 34, n 4, p 22-25, April, 2012
- 13) Peng Li, **Songling Huang**, Shen Wang, Wei Zhao. Development of a Pulse Exciting Source for Electromagnetic Ultrasonic Detection. *Electrical Measurement & Instrumentation*, v 49, n 2, p 76-79, February, 2012
- 14) Junjie Chen, Wei Zhao, **Songling Huang**. Developing Progress and Tendency of Networked Instruments and Measuring Technology. *Electrical Measurement & Instrumentation*, v 49, n 3, p 1-6, March, 2012
- 15) Kang Yao, Wei Zhao, **Songling Huang**. Discussion on a new concept of measuring instruments-Instrument Cloud. *China Measurement & Test*, v 38, n 2, p 1-5, March, 2012
- 16) Rujiao Duan, Wei Zhao, **Songling Huang**, Jianye Chen. Automatic Measurement Method of the Catenary Localizer Slope Based on Computer Vision. *China Railway Science*, v 32, n 4, p 82-87, July, 2011
- 17) Kang Yao, Wei Zhao, **Songling Huang**. Multi-layer Software Architecture Design of Advanced Measurement Infrastructure Under Smart Grid Framework. *Journal of Astronautic Metrology and Measurement*, v 31, n 1, p 41-45, February, 2011
- 18) Mingsong Shao, **Songling Huang**, Wei Zhao, Changquan Wang, Jiarui Dong, Zanji Wang. Parameter Optimization for 2.65 MHz Electrodeless Ballast. *J Tsinghua Univ (Sci & Tech)*, v 51, n 7, p 928-932, July, 2011
- 19) Huacheng Feng, **Songling Huang**, et al. Development of the 3 — D Magnetic Flux Leakage Measurement Platform. *Electrical Measurement & Instrumentation*, v 48, n 4, p 27-29, April, 2011
- 20) Kuansheng Hao, **Songling Huang**, Wei Zhao, Shen Wang. Analytical Modelling and Calculation of Impedance and Pulsed Magnetic Field for Rectangular Meander Coil Based on Second Order Potential. *Acta Phys. Sin.*, v 60, n 7, July, 2011
- 21) **Songling Huang**, Chen Xu, Wei Zhao, Peng Xu. Finite Element Simulation Analyses of an Eddy Current Testing Coil for Inspecting Oil and Gas Pipeline Deformation. *J Tsinghua Univ (Sci & Tech)*, v 51, n 3, p 390-394, March, 2011
- 22) Leyi Ge, **Songling Huang**, Wei Zhao. A Novel Modal Analysis Method on Fiber Optical Gyroscope Fixture. *Engineering & Test*, v 50, n 4, p 3-5, December, 2010
- 23) Zhigang Zhao, Wei Zhao, Claire Gu, **Songling Huang**. A Spectrum Signals Detection Method for Surface Enhanced Raman Scattering under High Fluorescence and Background Noise. *Spectroscopy and Spectral Analysis*, v 30, n 8, p 2146-2150, August, 2010
- 24) Rujiao Duan, Wei Zhao, **Songling Huang**, Jianye Chen. Fast Line Detection Algorithm Based on Improved Hough Transformation. *Chinese Journal of Scientific Instrument*, v 31, n 12, p 2774-2780, December, 2010

- 25) Wei Zhao, Kang Yao, **Songling Huang**. Understanding and Recognition of the Advanced Metering Infrastructure and its Related Concepts. *Electrical Measurement & Instrumentation*, v 47,n 7, p 1-4, July, 2010
- 26) Chen Xu, **Songling Huang**, Wei Zhao, Peng Xu. Oil and Gas Pipeline Deformation Low-frequency Eddy Current Testing Method. *Electrical Measurement & Instrumentation*, v 47,n 6, p 10-13, June, 2010
- 27) Yun Tong, **Songling Huang**, Wei Zhao. Oil and Gas Pipeline EMAT Data Compression Algorithm. *J Tsinghua Univ (Sci & Tech)*, v 50, n 10, p 1613-1616, October, 2010
- 28) Yun Tong, **Songling Huang**, Wei Zhao. Data Acquisition System for Tank Floor Inspection Tool Based on USB. *Electrical Measurement & Instrumentation*, v 47, n 4, p 57-61, April, 2010
- 29) Wei Zhao, Kang Yao, **Songling Huang**. Thinking of the Construction of Advanced Metering Infrastructure Under the Framework of the Smart Grid. *Electrical Measurement & Instrumentation*, v 47,n 5, p 1-7, May, 2010

(6) Authorized Patent

- **Songling Huang**, Mingsong Shao, Zanji Wang, Jianzhou Zhu. Circuit and its protection methods of nonpolar balp. Chinese Patent of Invention, Publication No: ZL2010101600550, 2013.03
- **Songling Huang**, Mingsong Shao, Zanji Wang, Jianzhou Zhu. Automatic matching method and system of Electrodeless lamp power supply. Chinese Patent of Invention, Publication No: ZL2010101555964, 2013.03
- **Songling Huang**, Shen Wang, Chengzhi Bizheng, Wei Zhao, Kuansheng Hao, Peng Li, Runqi Han. A coupling matching device used for EMAT thickness measuring probe. Chinese Patent of Invention, Publication No: ZL201110023402.X, 2012.08
- Wei Zhao, Baoguo Xu, **Songling Huang**, Jianquan Guo, Jing Yang, Tong Lin, Congpeng Huang, Aifang Cui, Jiarui Dong, Lin Zhang, Xinrong Zhang. A crop damage animal sound proofing system structure. Chinese Patent of Invention, Publication No: ZL200910237618.9, 2012.06
- Kaifeng Qu, Wei Zhao, **Songling Huang**, Bo Jiang, Hao Zhang, Peng Yang, Jing Wu. An anti-interference ability testing method of large current transformer with balance winding. Chinese Patent of Invention, Publication No: ZL200910000857.2, 2012.05
- Wei Zhao, Baoguo Xu, **Songling Huang**, Jianquan Guo, Jing Yang, Tong Lin, Congpeng Huang, Aifang Cui, Jiarui Dong, Lin Zhang, Xinrong Zhang. A collaborative digital sound proofing method for typical crops harm animal based on wireless sensor networks. Chinese Patent of Invention, Publication No: ZL200910237619, 2011.11
- **Songling Huang**, Shen Wang, Wei Zhao, Chaofeng Ye, Kuansheng Hao, Jiarui Dong. A gas pipeline crack detecting method based on oblique electromagnetic ultrasonic guided wave. Chinese Patent of Invention, Publication No: ZL200810238927.3, 2011.05
- **Songling Huang**, Wei Zhao, Kuansheng Hao, Shen Wang, Jiarui Dong, Yun Tong, Zheng Wei, Peng Li, Aifang Cui, Peng Xu. A probe for generating pipe axial ultrasonic guided wave. Chinese Patent of Invention, Publication No: ZL2010101226702, 2011.10
- **Songling Huang**, Wei Zhao, Jiarui Dong, Chen Xu, Wenjuan Lu, Dehui Wu. An internal and external wall defects identification method based on AC and DC composite magnetizing. Chinese Patent of Invention, Publication No: ZL200810055891.5, 2011. 01
- **Songling Huang**, Dehui Wu, Kuansheng Hao, Jiarui Dong, Wei Zhao. A rotor temperature distribution measuring method of high speed rotating permanent magnet synchronous motor. Chinese Patent of Invention, Publication No: ZL200810111665.4, 2010. 07
- **Songling Huang**, Wei Zhao, Xiaochun Song, Wei Cui. Defects identification and evaluating method based on three-dimensional finite element neural networks. Chinese Patent of Invention, Publication No: ZL200610164923.6, 2009. 04
- **Songling Huang**, Wei Zhao, Chaofeng Ye, Shen Wang, Yongsheng Zhang, Kuansheng Hao. Electromagnetic ultrasonic thickness measuring method. Chinese Patent of Invention, Publication No: ZL200810226405.1, 2010. 09

- **Songling Huang**, Wei Zhao, Xiaochun Song. Large steel Plate defects inspecting method based on magnetic flux leakage. Chinese Patent of Invention, Publication No: ZL200610012289.4, 2008. 10
- **Songling Huang**, Wei Zhao, Wei Cui, Jing Wu, Shen Wang. A corrosion defects quantification method of magnetic flux leakage. Chinese Patent of Invention, Publication No: ZL200510011116.6, 2007. 12
- **Songling Huang**, Wei Zhang, Wei Zhao, Jingtao Guo. An identification method of corrosion defect types of pipelines. Chinese Patent of Invention, Publication No: ZL200410068973.5, 2006. 06
- Luming Li, **Songling Huang**, Keren Shi. An inspecting method of buried ferromagnetic pipelines. Chinese Patent of Invention, Publication No: ZL02123442.6, 2005. 02
- Luming Li, **Songling Huang**. An inspecting method of active defects induced by stress or fatigue. Chinese Patent of Invention, Publication No: ZL03100611.6, 2004. 12
- Luming Li, **Songling Huang**, Xiaofeng Wang, Xing Chen. A magnetic inspecting method of stress distribution. Chinese Patent of Invention, Publication No: ZL01143445.7, 2003. 10
- Luming Li, **Songling Huang**, Laifu Wang, Haiqing Yang. An inspecting method of surface defects of ferromagnetic materials magnetized by geomagnetic field. Chinese Patent of Invention, Publication No: ZL 01123977.8, 2003. 12

(7) Computer Software Copyright

- **Songling Huang**, Wei Zhao, Shen Wang, Zhiyi Su, Jinglai Zhu. Data analysis software of oil and gas pipeline MFL inspecting V1.0. Chinese Computer Software Copyright. 2013/12/28
- **Songling Huang**, Shen Wang, Wei Zhao. Dispersion curve calculation software for plate guided wave V1.0. Chinese Computer Software Copyright. 2013/12/27
- **Songling Huang**, Shen Wang, Wei Zhao. Dispersion curve calculation software for pipeline axial guided wave V1.0. Chinese Computer Software Copyright. 2013/12/27
- **Songling Huang**, Shen Wang, Wei Zhao. Data acquisition software for EMAT testing V1.0. Chinese Computer Software Copyright. 2013/12/28
- **Songling Huang**, Shen Wang, Wei Zhao. Dispersion curve calculation software for large pipeline circumference guided wave V1.0. Chinese Computer Software Copyright. 2013/12/27

Teaching

(1) Undergraduates Courses

- Principles of Electric Circuits
- Fundamental of Virtual Instruments Design
- Laboratory Science Exploration Class: Virtual Instruments

(2) Postgraduates Courses

- LabVIEW Programming and Virtual Instruments Design
- Ferromagnetics and Electromagnetic Nondestructive Testing

Graduate Advising

(1) Graduated Students

- Post-Doc(6): Xiaochun Song, Dehui Wu, Shen Wang, Peng Xu, Leyi Ge, Huacheng Feng
- Ph.D.(4): Wei Cui, Shen Wang, Kuansheng Hao, Mingsong Shao
- M.S.(9): Junjun Xin, Xinyi Wu, Yun Tong, Chen Xu, Haiying Lu, Zheng Wei, Chengzhi Bizheng, Zhiyi Su, Qun Liu

(2) Current Graduate Students

- Post-Doc:
- Ph.D. candidate(4): Zheng Wei, Yu Zhang, Jinhui Han, Lisha Peng
- M.S. candidate(2): Xinmeng Liu, Tianjiao Qiao

(3) Awards of the Students

- Peng Li, Excellent B. S. Graduate Project of Tsinghua University, 2009. Supervisor: Wei Zhao, Songling Huang
 - Peng Yang, Excellent B. S. Graduate Project of Tsinghua University, 2006. Supervisor: Wei Zhao, Songling Huang
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