

Chunhui Zhao

Department of Chemical Engineering

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Education

Sept. 1999—Jul. 2003 Bachelor, Automation, Northeastern University, China.

Sept. 2003—Mar. 2006 Master, Control Theory and Control Engineering, Northeastern University, China.

Advisor: Prof. Fuli Wang

Mar. 2005—Jan. 2009 Ph.D, Control Theory and Control Engineering, Northeastern University, China.

Advisor: Prof. Fuli Wang

Jan. 2009—June, 2010 Postdoc, Department of Chemical and Biomolecular Engineering, The Hong Kong University of Science and Technology.

Advisor: Prof. Furong Gao

June, 2010— Postdoc, Department of Chemical Engineering, University of California, Santa Barbara.

Advisor: Prof. Frank Doyle

Research Interests

My research interests include, but are not limited to

Process monitoring;

Fault detection and diagnosis;

Quality interpretation and prediction;

Multivariate statistical analysis;

Multivariate calibration modeling.

Academic Research Experience

2008.3~2009.1 National Natural Science Foundation of China (No. 60774068): Theoretical study

2007.9~2009.1 Multivariate statistical method research for steel strip in cold rolled continuous annealing line in Shanghai Baoshan Iron & Steel Co., Ltd.: Scheme design and theoretical study

2005.9~2006.6 Supervision system for electric-arc furnace in Luquan steel and iron Ltd, Shijiazhuang: System design

2005.3~2009.1 Project 973 (2002CB312200), China: Theoretical study

2005.3~2006.3 National Natural Science Foundation of China (No. 60374003): Theoretical study

2005.3~2006.3 Supervision system for finery in Beiyong steel and iron Ltd., Benxi: System design

2004.9~2006.3 Supervision system for injection molding process (laboratory): System design and theoretical study

Other Experiences

2009 “Impression-Hong Kong” Essay contest: Second Prize

2005~2007 practice reporter and magazine editor in Neusoft Co., Ltd.

2005~2007 practice reporter of Northeastern University newspaper

2003 Essay Contest, Northeastern University: First Prize (the award-winning essay is embodied into “Feeling Northeastern University” series)

Honors and Awards

2009 Doctoral Thesis Prize of Northeastern University

2008 Doctoral fund program for ongoing “national excellent doctoral dissertation”

2007 Doctoral fund program for ongoing “national excellent doctoral dissertation”

2007 “HanWang” Doctoral Scholarship of Northeastern University (the top scholarship in Control Theory and Control Engineering)

2007 Excellent Paper Award in the conference of System simulation technique and application

2006 Excellent Postgraduate Scholarship of Northeastern University, First Prize

2005 Excellent Postgraduate Scholarship of Northeastern University, First Prize

2004 Excellent Postgraduate Scholarship of Northeastern University, First Prize

2004 All-Round Excellent Postgraduate Honor of Northeastern University

2003 Outstanding Graduate Honor of Northeastern University

2003 Studying Model Honor of Northeastern University
2002 Excellent Student Leader Honor of Northeastern University
2002 First Rank Scholarship of Northeastern University
2001 First Rank Scholarship of Northeastern University
2000 “JianLong” Scholarship of Northeastern University, First Prize
2000 First Rank Scholarship of Northeastern University

Selected Courses(/100)**

Postgraduate courses:

- English: 93, rank 1;
- Fuzzy Mathematics: 92;
- Intelligent Optimization Method: 91;
- Robotics: 90;
- Optimization Method and Theory: 74
- Adaptive Control Theory and Application: 95;
- System Identification: 87;
- Control System Stability and Robustness: 90;
- Artificial Neural Network: 93;
- Linear System: 85;
- Matrix Analysis: 77.

Undergraduate courses:

- English: 95;
- Advanced Mathematics: 87;
- Applied Mathematical Statistics: 93;
- Probability: 90;
- Complex Functions: 95;
- Operational Research: 92;
- Automatic Control Theory: 90;
- Electronics Theory: 100, rank 1;
- Linear Algebra: 95;
- Modern Control Theory: 96, rank 1;
- Science and Technology English: 96;
- Physics: 94, rank 1;

- Metalworking Practice: 95;
- Digital Signal Processing: 85.

Publications

International Journals:

1. **Chunhui Zhao**, Fuli Wang, and Mingxing Jia. Dissimilarity analysis based batch process monitoring using moving windows. *AICHE Journal*, 2007, 53(5), 1267-1277.
2. **Chunhui Zhao**, Fuli Wang, Zhizhong Mao, Ningyun Lu, and Mingxing Jia. Quality prediction based on phase-specific average trajectory for batch processes. *AICHE Journal*, 2008, 54(3), 693-705.
3. **Chunhui Zhao**, Furong Gao, Yuan Yao, and Fuli Wang. A Robust Calibration Modeling Strategy for Analysis of Interference-subject Spectral Data. *AICHE Journal*, 2010, 56 (1), 196-206.
4. **Chunhui Zhao**, Furong Gao, and Fuli Wang. An improved independent component regression modeling and quantitative calibration procedure. *AICHE Journal*, 2010, 56 (6), 1519-1535.
5. **Chunhui Zhao**, Furong Gao, Dapeng Niu, and Fuli Wang. Enhanced Process Comprehension and Quality Analysis Based on Subspace Separation for Multiphase Batch Processes. *AICHE Journal*, in press.
6. **Chunhui Zhao**, Furong Gao, Fuli Wang. New Spectra Data Analysis and Calibration Modeling Method Using Spectra Subspace Separation and Multiblock Independent Component Regression Strategy. *AICHE Journal*, in press.
7. **Chunhui Zhao**, Furong Gao, Fuli Wang. A Bi-directional Between-set Statistical Analysis Method and Its Applications. *AICHE Journal*, in press.
8. **Chunhui Zhao**, Fuli Wang, Ningyun Lu, and Mingxing Jia. Stage-based soft-transition multiple PCA modeling and on-line monitoring strategy for batch processes. *Journal of Process Control*, 2007, 17(9), 728–741.
9. **Chunhui Zhao**, Fuli Wang, and Yingwei Zhang. Nonlinear process monitoring based on kernel dissimilarity analysis. *Control Engineering Practice*, 2009, 17(1), 221-230.
10. **Chunhui Zhao**, Fuli Wang, Furong Gao, Ningyun Lu, and Mingxing Jia. Adaptive Monitoring Method for Batch Processes Based on Phase Dissimilarity Updating with Limited Modeling Data. *Industrial & Engineering Chemistry Research*, 2007, 46(14), 4943-4953.
11. **Chunhui Zhao**, Fuli Wang, Zhizhong Mao, Ningyun Lu, and Mingxing Jia. Improved Knowledge Extraction and Phase-based Quality Prediction for Batch Processes. *Industrial &*

Engineering Chemistry Research, 2008, 47(3), 825-834.

12. **Chunhui Zhao**, Fuli Wang, Zhizhong Mao, Ningyun Lu, and Mingxing Jia. Improved Batch Process Monitoring and Quality Prediction Based on Multi-phase Statistical Analysis. *Industrial & Engineering Chemistry Research*, 2008, 47(3), 835-849.

13. **Chunhui Zhao**, Fuli Wang, Zhizhong Mao, Ningyun Lu, and Mingxing Jia. Adaptive monitoring based on ICA for multi-phase batch processes with limited modeling data. *Industrial & Engineering Chemistry Research*, 2008, 47(9), 3104-3113.

14. **Chunhui Zhao**, Fuli Wang, Furong Gao, and Yingwei Zhang. Enhanced Process Comprehension and Statistical Analysis for Slow-varying Batch Processes. *Industrial & Engineering Chemistry Research*, 2008, 47(24), 9996-10008.

15. **Chunhui Zhao**, Furong Gao, and Fuli Wang. Nonlinear Batch Process Monitoring Using Phase-based Kernel Independent Component Analysis-Principal Component Analysis (KICA-PCA). *Industrial & Engineering Chemistry Research*, 2009, 48 (20), 9163–9174.

16. **Chunhui Zhao**, Furong Gao, and Fuli Wang. Phase-based Joint Modeling and Spectroscopy Analysis for Batch Processes Monitoring. *Industrial & Engineering Chemistry Research*, 2010, 49 (2), 669–681.

17. **Chunhui Zhao**, Fuli Wang, and Furong Gao. Covariance-oriented qualitative and quantitative analysis in multivariate calibration for multiphase batch processes. *The Canadian Journal of Chemical Engineering*, 2009, 87(3), 466-476.

18. **Chunhui Zhao**, Fuli Wang, and Furong Gao. Improved Calibration Investigation using Phase-wise Local and Cumulative Quality Interpretation and Prediction. *Chemometrics and Intelligent Laboratory Systems*, 2009, 95(2), 107-121.

19. Yuan Yao, **Chunhui Zhao**, and Furong Gao. Batch-to-Batch Steady State Identification Based on Variable Correlation and Mahalanobis Distance. *Industrial & Engineering Chemistry Research*, 2009, 48(24), 11060-11070.

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Chinese Journals:

1. **Chunhui Zhao**, Fuli Wang, Yuan Yao, Furong Gao. Phase-based statistical modeling, online monitoring and quality prediction for batch processes. *Acta Automatica Sinica*. Accepted.

2. **Chunhui Zhao**, Fuli Wang, Mingxing Jia. Statistical process monitoring based on data structure distribution in principal subspace. *Chinese Journal of Scientific Instrument*, 2008, 29(8), 1598-1604.

3. Mingxing Jia, **Chunhui Zhao**, Fuli Wang, Zhizhong, Mao, Li Hongru. Nonlinear principal component analysis based on RBF neural network and principal curve. Chinese Journal of Scientific Instrument. 2008, 29(3), 453-457.
4. Mingxing Jia, Dapeng Niu, Fuli Wang, **Chunhui Zhao**. New Nonlinear Principal Analysis Method Based on RBF Neural Network. Journal of System Simulation, 2007, 19(24), 5684-5687.

Conference Proceedings:

1. **Chunhui Zhao**, Furong Gao. Improved Phase-based Calibration Modelling and Quality Prediction by Investigating the Effects of Inter-phase Correlation. The 9th International Symposium on Dynamics and Control of Process Systems, 2010, *accepted*.
2. **Chunhui Zhao**, Furong Gao, Fuli Wang. Improved Independent Component Regression Modeling. IEEE Conference on Decision and Control & Chinese Control Conference, December 16-18, 2009, Shanghai, China, 1507-1512.
3. **Chunhui Zhao**, Furong Gao, Fuli Wang. An Improved Statistical Modeling Strategy by Spectroscopy for Online Monitoring and Diagnosis of Batch Processes. The Seventh Asian Control Conference, August 27-29, 2009, Hong Kong, 893-898.
4. **Chunhui Zhao**, Fuli Wang, Zhizhong Mao. An adaptive DISSIM algorithm for statistical process monitoring. 17th IFAC World Conference, July 6-11, 2008, Seoul, Korea. 4529-4534.
5. **Chunhui Zhao**, Fuli Wang, Zhizhong Mao. Investigation of Nonlinear Orthogonal Signal Correction Algorithm and Its Effects on Multivariate Calibration. The 10th International Conference on Control, Automation, Robotics and Vision, 2008, Hanoi, Vietnam, 2049-2054.
6. **Chunhui Zhao**, Fuli Wang, Mingxing Jia. Stage-based Multiple PCA Modeling and On-line Monitoring Strategy for Batch Processes, Proceedings of the 6th World Congress on Intelligent Control and Automation, June 21-23, 2006, Dalian, China. 5805-5809.
7. **Chunhui Zhao**, Fuli Wang, Mingxing Jia. Application of an improved clustering algorithm to batch process online monitoring. Proceedings of 2006 Chinese Control and Decision Conference, 612-614, 618.
8. Mingxing Jia, **Chunhui Zhao**, Fuli Wang. A new method for decision on the structure of RBF neural network. International Conference on Computational Intelligence and Security, November 3-6. 2006, Guangzhou, China. 147-150.
9. Mingxing Jia, Xiaoping Guo, **Chunhui Zhao**, Dong Xiao. Nonlinear fault diagnosis

based on RBF with sliding window error feedback. IMACS multiconference on “Computational Engineering in Systems Applications” (CESA), October 4-6, 2006, Beijing, China. 1980-1983.

10. Dapeng Zhang, Fuli Wang, Dakuo He; **Chunhui Zhao**, Haifeng Sang. Particle Swarm Optimization for Solving a Shooting Point. Proceedings of the 6th World Congress on Intelligent Control and Automation, June 21-23, 2006, Dalian, China. 3538-3541.

Submitted International Journal papers:

1. **Chunhui Zhao**, Furong Gao, Fuli Wang. Multiphase Calibration Modeling and Quality Interpretation by Priority Sorting. *AIChE Journal*, *under review*.
2. **Chunhui Zhao**, Furong Gao. Spectra Calibration Modeling and Statistical Analysis for Cumulative Quality Interpretation and Prediction. *AIChE Journal*, *under review*.
3. **Chunhui Zhao**, Yuan Yao, Furong Gao. Statistical Analysis and Online Monitoring for Multimode Processes with Between-mode Transitions. *Chemical Engineering Science*, *revised*.
4. **Chunhui Zhao**, Furong Gao. Two-step Basis Vector Extraction for Multiset Variable Correlation Analysis. *Chemometrics and Intelligent Laboratory Systems*, *submitted*.
5. **Chunhui Zhao**, Shengyong Mo, Furong Gao, Ningyun Lu, Yuan Yao. Enhanced Statistical Analysis and Online Monitoring for Handling Multiphase Batch Processes with Varying Durations. *Journal of Process Control*, *under review*.
6. **Chunhui Zhao**, Furong Gao. Multiblock-based Qualitative and Quantitative Spectra Calibration Analysis. *Industrial & Engineering Chemistry Research*, *revised*.
7. **Chunhui Zhao**, Uwe Kruger, Furong Gao. Canonical Correlation Partial Least Squares, ongoing.
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