

Curriculum Vitae of Fan Zhang

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CONTACT INFORMATION

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RESEARCH AREAS

- Computational fluid dynamics,
- Surface and ground water hydrology
- Geochemical equilibrium and kinetics

EDUCATION

8/2001 – 5/2005 UNIVERSITY OF CENTRAL FLORIDA, ORLANDO, FLORIDA

- Ph.D., Civil Engineering
- Dissertation: A New Paradigm of Modeling Watershed Water Quality
- Advisor: Dr. Gour-Tsyh (George) Yeh

8/1998 – 6/2000 TSINGHUA UNIVERSITY, BEIJING, P. R. CHINA

- M.S., Civil Engineering
- Thesis: Study on the Application of KDF Media for Groundwater Treatment
- Advisor: Dr. Xiang Liu

8/1994 – 6/1998 TSINGHUA UNIVERSITY, BEIJING, P. R. CHINA

- B.S., Environmental Engineering
- Thesis: Study on the Hydrodynamic of Inner Loop Three Phases Fluidized Bed Bioreactor
- Advisor: Dr. Hanchang Shi

PROFESSIONAL EXPERIENCE

3/2008 – PRESENT RESEARCH STAFF SCIENTIST, ENVIRONMENTAL SCIENCES DIVISION, OAK RIDGE NATIONAL LABORATORY, OAK RIDGE, TENNESSEE

5/2005 – 3/2008 POSTDOCTORAL RESEARCH ASSOCIATE, OAK RIDGE ASSOCIATED UNIVERSITIES, ENVIRONMENTAL SCIENCE DIVISION, OAK RIDGE NATIONAL LABORATORY, OAK RIDGE, TENNESSEE

- HGC5: a subsurface model of fluid flow, thermal transport, hydrologic transport, and biogeochemical reactions in saturated/unsaturated media
- Application of HGC5 to the Oak Ridge Reservation in east Tennessee to investigate groundwater remediation under natural attenuation and engineered manipulation conditions
 - Simulation of lab experiments to study geochemistry of contaminants, such as Uranium and Cobalt.
 - Simulation of field plot transport to interpret tracer studies and facilitate of field scale study design.

- Simulation of watershed scale coupled density dependent flow and chemical transport in anisotropic porous media and utilized an inverse solution module for model calibration and parameter estimation.
- Modeled groundwater flow and non-aqueous phase liquid (NAPL) dissolution and transport with volatilization.
- Performed heat transfer and reactive chemical simulation for oil shale retort experiments and evaluated an “equivalent” first-order transfer function approximation for spherical matrix diffusion.

8/2000 – 5/ 2005 RESEARCH ASSISTANT, UNIVERSITY OF CENTRAL FLORIDA, ORLANDO, FLORIDA

- ELLAM: an Eulerian-Lagrangian Localized Adjoint Method to solve highly nonlinear transport equations for multiphase flow and reactive chemical transport.
- LEZOOMPC: a Lagrangian-Eulerian- method with adaptive ZOOMing and Peak/Valley Capture scheme for nonlinear transport problems with moving sharp-front.
- WASH123D: a watershed model to simulate water flow, sediment and reactive transport in river/stream networks, surface runoff and ground water
- BEST3D: an estuary model to simulate hydrodynamics and sediment-salinity-reactive chemical transport in bays and coastal waters

8/1998 – 6/2000 RESEARCH ASSISTANT, TSINGHUA UNIVERSITY, BEIJING, P. R. CHINA

- Effect of KDF media, a granular material composed of high-purity copper-zinc alloy, on the treatment of groundwater lightly contaminated with metals, such as Pb(II) and Cr(VI).
- Effect of mechanical stirring speed on the coagulation and settling of contaminants with various chemical additives for treatment of wastewater from paper mills.

INVITED REVIEWER OF MANUSCRIPTS

- Department of Energy (DOE) Small Business Innovation Research (SBIR) Phase II Proposal Review Panel , 2008
- Frontiers of Environmental Science & Engineering in China (2008-present)
- Computational Geosciences (2008-present)
- Water Resources Research (2008-present)
- Journal of Contaminant Hydrology (2006)
- Transport in Porous Media Journal (2005 – present)

MEMBERSHIP

- American Geophysical Union

AWARDS

- Kersten Graduate Fellowship, University of Central Florida, 2002-2004
- Outstanding Student Paper Award, American Geophysical Union, 2003
- Graduate Travel Fellowship, University of Central Florida, 2002
- Guanghua fellowship, Tsinghua University, 1999
- Outstanding Graduate Award, Tsinghua University, 1998
- IET Undergraduate scholarship, IET Educational Funding, 1997-1998
- 1st-Class Excellent Student scholarship, Tsinghua University, 1995-1996
- 1st-Class Excellent Student scholarship, Tsinghua University, 1994-1995

- 3rd-Class Award of Hebei Province, the 1994 National High School Chemist Contest, 1994
- 1st-Class Award of Hebei Province, the 10th National High School Physics Contest, 1993

PUBLICATIONS

BOOK CHAPTER

1. Yeh, G. T., G. B. Huang, H. P. Cheng, **F. Zhang**, H. C. Lin, E. Edris, and D. Richards, 2005. "A First Principle, physics-based watershed model: WASH123D". Chapter 9 in *Watershed Models* (V. P. Singh and D. K. Frevert, ed.), CRC Press LLC, 6000 Broken Sound Parkway, NW, (Suite 300) Boca Raton, FL 33487, USA. pp. 211-244.

TECHNICAL REPORT

1. Yeh, G. T., G. B. Huang, **F. Zhang**, H. P. Cheng, and H. C. Lin, 2006. WASH123D: A Numerical Model of Flow, Thermal Transport, and Salinity, Sediment, and Water Quality Transport in WaterShed Systems of 1-D Stream-River Network, 2-D Overland Regime, and 3-D Subsurface Media. A Technical Report Submitted To EPA. Dept. of Civil and Environmental Engineering, University of Central Florida, Orlando, FL 32816.

JOURNAL ARTICLES

1. **Zhang, F.**, B. Gu, J. C. Parker, W. Luo, B. P. Spalding, S. C. Brooks, D. B. Watson and P. M. Jardine Geochemical reactions affecting aqueous-solid partitioning metals during titration of uranium contaminated soil. *Environmental Science and Technology*. Submitted (2008).
2. Yeh, G. T., Y. Fang, **F. Zhang**, J. Sun, Y. Li, M. H. Li, and M. D. Siegel. "Numerical Modeling of Coupled Fluid Flow and Thermal and Reactive Biogeochemical Transport in Porous and Fractured Media". *Computational Geosciences*. Submitted (2008).
3. **Zhang, F.**, S. C. Brooks, J. C. Parker, Y.-J. Kim, P. M. Jardine and D. B. Watson. Comparison of Approaches to Calibrate a Surface Complexation Model for U(VI) Sorption to Weathered Saproliite. *Transport in Porous Media Journal*. Submitted (2008)
4. **Zhang, F.**, G. T. Yeh, J. C. Parker, C. Wang, R. Gu, and P. M. Jardine. "A reaction-based river/stream water quality model: Reaction network decomposition and model validation". *Journal of Environmental Engineering*. Submitted (2007).
5. Mayes, M. A., J. C. Parker, G. Tang, **F. Zhang**, X. L. Yin, L. D. McKay, P. M. Jardine. Anisotropy of Transport Parameters in Coarse, Layered Hanford Sediments. *Soil Science Society of America Journal*. Submitted (2007)
6. Kim, Y.-J., S. C. Brooks, W. Kamolpornwijit, **F. Zhang**, J. C. Parker, J.-W. Moon, and Y. Roh. Fate and Transport of Uranium (VI) in Weathered Saproliite. *Journal of Contaminant Hydrology*. Submitted. (2007)
7. Yan X., E. Radwan, **F. Zhang**, and J. C. Parker. Evaluation of Dynamic Passing Sight Distance Problem Using a Finite Element Model. *Journal of Transportation Engineering*. In press. (2008).
8. **Zhang, F.**, G. T. Yeh, J. C. Parker, and P. M. Jardine. "A reaction-based river/stream water quality model: Model development and numerical schemes". *Journal of Hydrology*. 348: 496-509 (2008).
9. **Zhang, F.**, L. Jiang, G. T. Yeh, and J. C. Parker. "An Adaptive Local Grid Refinement and Peak/Valley Capture Algorithm to Solve Nonlinear Transport Problems with Moving Sharp-Fronts". *Transport in Porous Media Journal*. 72: 53-69. (2008).
10. **Zhang, F.**, G. T. Yeh, J. C. Parker, S. C. Brooks, M. N. Pace, Y.-J. Kim, P. M. Jardine, and D. B. Watson. "A reaction-based paradigm to model reactive chemical transport in groundwater with general kinetic and equilibrium reactions". *Journal of Contaminant Hydrology*. 92: 10-32 (2007).

11. **Zhang F.** and X. Liu. “An experimental study on the treatment of phenol in water by KDF metallic media”. *China Water and Wastewater Journal*, 25: 35-38 (2001).

PEER-REVIEWED CONFERENCE PROCEEDINGS

1. Parker J. C. and **F. Zhang**. Modeling in Situ Shale Oil Retorting. *Proceedings of the 26th Oil Shale Symposium*. Golden, Colorado, USA. October 16-18 (2006).
2. Yeh G. T., **F. Zhang**, T.-S. Wu, and G. Hu. BEST3D: A Numerical Hydrodynamics and Water Quality Model: 2 – Water Quality. *Proceedings of the seventh international conference on hydroscience and engineering*. Philadelphia, Pennsylvania, USA. September 10-13 (2006).
3. Yeh, G. T., G. B. Huang, **F. Zhang**, H. P. Cheng, H. C. Lin, J. R. Cheng, E. Edris, and D. Richards. “An Integrated Media, Integrated Processes Watershed Model-WASH123D: Part 1-Model Descriptions and Features”. *Proceedings of the XVIth International Conference on Computational Methods in Water Resources*. Copenhagen, Denmark. June 18-22 (2006).
4. **Zhang, F.**, and G. T. Yeh. “An Integrated Media, Integrated Processes Watershed Model-WASH123D: Part 6-Sediment and Reactive Chemical Transport in Stream/River Networks”. *Proceedings of the XVIth International Conference on Computational Methods in Water Resources*. Copenhagen, Denmark. June 18-22 (2006).
5. **Zhang F.** and G. T. Yeh. “An Integrated Media, Integrated Processes Watershed Model-WASH123D: Part 7-Sediment and Reactive Chemical Transport in Surface Runoff”. *Proceedings of the XVIth International Conference on Computational Methods in Water Resources*. Copenhagen, Denmark. June 18-22 (2006).
6. **Zhang, F.**, G. T. Yeh, J.C. Parker, S. C. Brooks, M.N. Pace, Y. J. Kim, and P.M. Jardine “An Integrated Media, Integrated Processes Watershed Model-WASH123D: Part 8-Reactive Chemical Transport in Subsurface Media”. *Proceedings of the XVIth International Conference on Computational Methods in Water Resources*. Copenhagen, Denmark. June 18-22 (2006).
7. Yeh, G. T., **F. Zhang**, J. Yu, T. S. Wu, and G. Hu. “A Reaction-based, Diagonalization Approach to Water Quality Modeling”. *Estuarine and Coastal Modeling -- Proceedings of the Ninth International Conference*. Charleston, South Carolina, USA. October 31-November 2 (2005).
8. Yeh, G. T., **F. Zhang**, T. S. Wu, and G. Hu. “Are the status quo water quality models adequate for TMDL?” *Proceedings of the Third Conference on Watershed Management to Meet Water Quality Standards and Emerging TMDL (Total Maximum Daily Load)*. Atlanta, Georgia, USA. March 5-9 (2005).
9. Yeh, G. and **F. Zhang**. An Adaptive Local Grid Refinement and Peak/Valley Capture Algorithm to Solve Nonlinear Transport Problems with Moving Sharp-Fronts. *Proceedings of the 6th International Conference on Hydroinformatics*. Singapore, June 21-24 (2004).
10. Yeh, G., H. Shan, **F. Zhang**, and G. Hu. A Bay-Estuarine Model to Simulate Hydrodynamics and Thermal, Salinity, Sediment, and Water Quality Transport in Three Dimensions (BEST3D). *Proceedings of the 6th International Conference on Hydroinformatics*. Singapore, June 21-24 (2004).
11. **Zhang, F.** and G. T. Yeh. “A General Paradigm of Modeling Two-Dimensional Overland Watershed Water Quality”. *Proceedings of the XVth International Conference on Computational Methods in Water Resources*. Chapel Hill, North Carolina, USA. June 13-17 (2004).
12. **Zhang, F.** and G. T. Yeh. “A General Paradigm of Modeling Three-Dimensional Coastal Water Quality”. *Proceedings of the Sixth International Conference on Hydro-science and Engineering*. Brisbane, Australia. May 30-June 3 (2004).
13. **Zhang, F.**, G. T. Yeh, and H. Suk. “An Investigation of various Eulerian-Lagrangian Localized Adjoint Methods and Lagrangian-Eulerian Finite Element Methods to Solve Transport Problems”.

Proceedings of the XIVth International Conference on Computational Methods in Water Resources.
Delft, the Netherlands. June 23-28 (2002).

CONFERENCE POSTERS AND PRESENTATIONS

1. **Zhang, F.**, J. Luo, W. Luo, J. C. Parker, B. Gu, B. P. Spalding, S. C. Brooks, D. B. Watson, P. M. Jardine. Multi-Process and Multi-Scale Modeling and Data Analysis at IFC site, Oak Ridge, TN. *Department of Energy's Environmental Remediation Science Program 3rd Annual Principal Investigator Meeting*, Lansdowne, Virginia April 7-9, 2008
2. Gu, B., W.-M. Wu, W. Luo, C. Schadt, G. Zhang, S. Brooks, S. Kelly, K. Kemner, **F. Zhang**, J. Parker, A. Palumbo, J. Zhou, J. Kostka, C. Criddle, D. Watson, and P. Jardine. Oak Ridge IFC: Subsurface pH and Oleate Manipulation for the Immobilization of Uranium. *Department of Energy's Environmental Remediation Science Program 3rd Annual Principal Investigator Meeting*, Lansdowne, Virginia April 7-9, 2008
3. Jardine, P.M., D.B. Watson, G. Baker, C.C. Brandt, S.C. Brooks, C.S. Criddle, C.T. Gaten, B. Gu, J. Horita, S.S. Hubbard, S. Kelly, K. Kemner, P. K. Kitanidis, J. Kostka, J. Luo, A.V. Palumbo, J.C. Parker, T.J. Phelps, C.W. Schadt, B.P. Spalding, W.N. Wu, **F. Zhang**, and J. Zhou. Research Highlights and Future Directions at the Oak Ridge Integrated Field Research Challenge *Department of Energy's Environmental Remediation Science Program 3rd Annual Principal Investigator Meeting*, Lansdowne, Virginia April 7-9, 2008
4. P. M. Jardine, D. B. Watson, G. Baker, C.C. Brandt, S.C. Brooks, C.S. Criddle, C.T. Gaten, B. Gu, J. Horita, S.S. Hubbard, S. Kelly, K. Kemner, P. K. Kitanidis, J. Kostka, J. Luo, A.V. Palumbo, J.C. Parker, T.J. Phelps, C.W. Schadt, B.P. Spalding, W.-M. Wu, **F. Zhang**, and J. Zhou. Exploring Uranium Fate and Transport in Contaminated Subsurface Environments: Technology Transfer Opportunities for Uranium Mine Restoration. *Canadian Uranium Symposium: Fueling the Nuclear Renaissance*. Vancouver, Canada. April 2-3, 2008.
5. Yeh, G.-T., Y. Fang, J. Sun, M.-H. Li, **F. Zhang**, and M. D. Siegel. Numerical Modeling of Coupled Fluid Flow and Thermal and Reactive Biogeochemical Transport in Porous and Fractured Media. *The International Workshop on Modeling Reactive Transport in Porous Media*. Trasbourg, France. January 21-24, 2008. **Zhang, F.**, J. C. Parker, B. Gu, W. Luo, S. C. Brooks, B. P. Spalding, P. M. Jardine, D. B. Watson. A Geochemical Reaction Model for Titration of Contaminated Soil and Groundwater at the Oak Ridge Reservation. *The AGU 2007 Fall Meeting*. Abstract accepted. San Francisco, California, USA. December 10-14 (2007).
6. Parker J. C. and **F. Zhang**. Efficient Heat and Mass Transfer Formulations for Oil Shale Retorting. *The AGU 2007 Fall Meeting*. Abstract accepted. San Francisco, California, USA. December 10-14 (2007).
7. Parker, J., **F. Zhang** and E. Park. A Model for dissolved solvent transport with DNAPL Source Depletion, volatilization and decay: numerical and analytical solutions and uncertainty analysis. *Partners in Environmental Technology Technical Symposium & Workshop*. Washington, D.C., USA. November 28-30 (2006).
8. **Zhang, F.**, J. Parker, P. Jardine, M. Mayes, T. Mehlhorn, J.-P. Guo, and S. Cesar. Scale Effects on Apparent Reaction Kinetics at the Oak Ridge FRC. *Environmental Remediation Sciences Program Fall Meeting*. Oak Ridge, Tennessee, USA. October 23-25 (2006).
9. Yeh, G. T., **F. Zhang**, T. S. Wu, and G. Hu. "A Bay-Estuarine Model to Simulate Hydrodynamics and Thermal, Salinity, Sediment, and Water Quality Transport in 3-Dimensions (BEST3D)". 2005

- Florida Bay and Adjacent Marine Systems Science Conference*. Duck Key, Florida, USA. December 11-14 (2005).
10. Yu, J., G. Yeh, **F. Zhang**, T. Wu, and G. Hu. "A Reaction-based Diagonalization Approach to Modeling Surface Water Quality". *The AGU 2005 Fall Meeting*. San Francisco, California, USA. December 5-9 (2005).
 11. **Zhang, F.**, J. C. Parker, D. B. Watson, E. Park, and S. C. Brooks. "Subsurface Flow and Non-reactive Transport Modeling at the Oak Ridge FRC". *Oak Ridge Field Research Center Workshop*. Oak Ridge, Tennessee, USA. October 24-26 (2005).
 12. **Zhang, F.**, J. Parker, D. Watson, K. Lowe, K. Hyder, and S. Brooks. "FRC Local Area 3 Model Development". *Oak Ridge Field Research Center Workshop*. Oak Ridge, Tennessee, USA. October 24-26 (2005).
 13. **Zhang, F.** and G. Yeh. "A General Paradigm of Modeling Three-Dimensional Subsurface Water Quality." *The AGU 2004 Fall Meeting*. San Francisco, California, USA. December 13-17 (2004).
 14. Shan, H., **F. Zhang**, G. Yeh, G. Hu, and T. Wu. "An Integrated Surface Water and Groundwater Model of Fluid Flow and Thermal, Salinity, Sediment and Reactive Biogeochemical Transport." *The AGU 2004 Fall Meeting*. San Francisco, California, USA. December 13-17 (2004).
 15. J. Parker, E. Park, **F. Zhang**, and G. Yeh. 2004. FRC Numerical Modeling Update. *Oak Ridge Field Research Center Workshop*. Oak Ridge, Tennessee, USA. October 18-20 (2004).
 16. **Zhang, F.** and G. Yeh. "A New Paradigm of Modeling Two-Dimensional Overland Watershed Water Quality". *The AGU 2003 Fall Meeting*. San Francisco, California, USA. December 8-12 (2003).
 17. Yeh, G., H. Cheng, H. Lin, **F. Zhang**, E. V. Edris, and D. R. Richards. "Integrated Modeling of Infiltration, Evapotranspiration, Recharge, Subsurface Flow, Surface Runoff, and River Flow with First Principle, Physics-based Approaches". *The AGU 2003 Fall Meeting*. San Francisco, California, USA. December 8-12 (2003).
 18. Yeh, G. T., Y. Fang and **F. Zhang**, "A New Paradigm of Modeling Reactive Biogeochemical Transport". *The SIAM Conference on Mathematical & Computational Issues in the Geosciences*. Austin, Texas, USA. March 17-20 (2003).
 19. **Zhang, F.**, G. Yeh, and Y. Fang. "A New Paradigm of Modeling One-Dimensional River/stream Watershed Water Quality". *The AGU 2002 Fall Meeting*. San Francisco, California, USA. December 6-10 (2002).