

# ***Michael C. Sukop, Assistant Professor***

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**Department of Earth Sciences**  
PC 346A, University Park  
Miami, FL 33199

Phone: 305-348-3117, Fax: 305-348-3877  
E-mail: [sukopm@fiu.edu](mailto:sukopm@fiu.edu)  
Web page: <http://www.fiu.edu/~sukopm>

**Interests:** Fluid dynamics in variably saturated fractured and porous media from pore to aquifer scale, solute and heat transport, density-dependent flow and transport, multiphase lattice Boltzmann models, porous media, fractals, multifractals, cellular automata, percolation phenomena, stochastics, geostatistics, surface chemistry

**Affiliation:** Department of Environmental Studies

## ***Education***

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**Postdoctoral Fellow, Civil and Environmental Engineering (Prof. D. Or).** University of Connecticut, 2002 – 2003

**Postdoctoral Fellow, Soil Physics (Prof. D. Or).** Utah State University, 2001 – 2002

**Ph.D. Soil Science (Civil Engineering Minor).** University of Kentucky, 1997 – 2001

**M.S. Soil Science.** Washington State University, 1986 – 1989

**Civil Engineering Water Chemistry.** University of Wisconsin-Madison, 1983 – 1984

**B.S. Geological Science.** The Pennsylvania State University, 1980 – 1982

**Geology.** Mercyhurst College, 1978 – 1980

## ***Other Education Experiences***

- Computer Modeling Workshop, Center for Advanced Cement-Based Materials/National Institute of Standards and Technology, June 11-14, 2001
- Parallel Computing Workshop, University of Kentucky Department of Civil Engineering, March 16-18, 2000
- USEPA Bioremediation of Hazardous Waste Sites Workshop, 1989. Seattle, WA
- USEPA Modeling Workshop -- Model for Metals Equilibrium Speciation, 1988. Boulder, CO
- USEPA Equivalent 40-hour course: "Safety and Operational Considerations at Hazardous Materials Sites", 1984. Numerous refreshers, Site Safety Coordinator training. WI, CA, CO

## ***Professional Registrations***

- California Certified Hydrogeologist No. 91
- California Registered Geologist No. 5615
- Kentucky Professional Geologist No. 2236

# Publications

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## Book

**Sukop, M.C.** and D.T. Thorne, Jr., 2006 (second printing 2007). *Lattice Boltzmann Modeling: An Introduction for Geoscientists and Engineers*. Springer, Heidelberg, Berlin, New York 172 p.

## Refereed Publications

Cunningham, K.J., **M.C. Sukop**, H. Huang, P.F. Alvarez, H. A. Curran, J.F. Dixon, and R.A. Renken. Prominence of ichnologically-influenced macroporosity in the karst Biscayne aquifer: stratiform "super-K" zones (accepted for publication in *Geological Society of America Bulletin*)

Anwar, S. and **M.C. Sukop**, 2008. Regional scale transient groundwater flow modeling using lattice Boltzmann methods (accepted for publication in *Progress in Computational Fluid Dynamics*)

Anwar, S., A. Cortis, and **M.C. Sukop**, 2008. Lattice Boltzmann Simulation of Solute Transport in Heterogeneous Porous Media with Conduits to Estimate Macroscopic Continuous Time Random Walk Model Parameters, *Progress in Computational Fluid Dynamics* 8:1-2, 213 - 221. doi: 10.1504/PCFD.2008.018092

**Sukop, M.C.**, H. Huang, C.L. Lin, M.D. Deo, K. Oh, and J.D. Miller, 2008. Distribution of multiphase fluids in porous media: Comparison between lattice Boltzmann modeling and micro-x-ray tomography, *Phys. Rev. E* 77, 026710. doi: 10.1103/PhysRevE.77.026710

Huang, H., D.T. Thorne, M.G. Schaap, and **M.C. Sukop**, 2007. Proposed approximation for contact angles in Shan-and-Chen-type multicomponent multiphase lattice Boltzmann models, *Phys. Rev. E* 76, 066701. doi: 10.1103/PhysRevE.76.066701

Thorne, Jr., D.T., C.D. Langevin, and **M.C. Sukop**, 2006. Addition of Simultaneous Heat and Solute Transport and Variable Fluid Viscosity to SEAWAT. *Computers and Geosciences* 32, 1758–1768. doi:10.1016/j.cageo.2006.04.005

Perfect, E., R.W. Gentry, **M.C. Sukop**, and J.E. Lawson, 2006. Multifractal Sierpinski Carpets: theory and application to modeling reservoir heterogeneity. *Geoderma* 134, 240-252. doi:10.1016/j.geoderma.2006.03.001

Chau, J.F., D. Or, and **M.C. Sukop**, 2005. Simulation of Gaseous Diffusion in Partially Saturated Porous Media Under Variable Gravity with Lattice Boltzmann Methods. *Water Resources Research* 41, W08410, doi:10.1029/2004WR003821

**Sukop, M.C.** and D. Or, 2005. Lattice Boltzmann method for homogeneous and heterogeneous cavitation. *Physical Review E*, 71, 046703.

**Sukop, M.C.** and E. Perfect, 2004. Solute Transport. In D. Hillel, C. Rosenzweig, D. Powlson, K. Scow, M. Singer and D.L. Sparks, Eds. *Encyclopedia of Soils in the Environment*, Elsevier Ltd., Oxford, U.K.

- Sukop, M.C.** and D. Or, 2004. Lattice Boltzmann method for modeling liquid-vapor interface configurations in porous media, *Water Resources Research*, 40, W01509, doi: 10.1029/2003WR002333.
- Sukop, M.C.** and D. Or, 2003. Invasion percolation of single component, multiphase fluids with lattice Boltzmann models. *Physica B* 338, 298-303.
- Sukop, M.C.**, G-J. van Dijk, E. Perfect, and W.K.P. van Loon, 2002. Percolation thresholds in 2-dimensional prefractal models of porous media. *Transport in Porous Media* 48, 187-208.
- Perfect, E., **M.C. Sukop**, and G.R. Haszler, 2002. Prediction of dispersivity for undisturbed soil columns from water retention parameters. *Soil Science Society of America Journal* 66, No. 3, 696-701.
- Sukop, M.C.** 2001. Dispersion in VLEACH and similar models. *Ground Water* 39, No. 6, 953-954.
- Sukop, M.C.**, E. Perfect, and N.R.A. Bird, 2001. Impact of homogeneous and heterogeneous algorithms on water retention in simulated prefractal porous media. *Water Resources Research* 37, 2631-2636.
- Perfect, E. and **M.C. Sukop**, 2001. Models relating solute dispersion to pore space geometry: a review. In *Physical and Chemical Processes of Water and Solute Transport/Retention in Soils*. D. Sparks and M. Selim. Eds. *Soil Sci. Soc. Am. Special Pub.* 56, 77-146.
- Sukop, M.C.** 2000. Estimation of vertical concentration profiles from existing wells. *Ground Water*, 38, No. 6, 836-841.
- Sukop, M.** and C.G. Cogger, 1992. Adsorption of Carbofuran, Metalaxyl, and Simazine:  $K_{oc}$  evaluation and relation to soil transport. *J. Environ. Sci. Health B27(5)* 565-590.

### ***Papers in Review***

- Anwar, S. and M.C. Sukop. Lattice Boltzmann models for flow and transport in phreatic karst (under review by *Ground Water*)
- Cihan, A., **M.C. Sukop**, J.S. Tyner, E. Perfect, and H. Huang. Analytical predictions and lattice Boltzmann simulations of intrinsic permeability for mass fractal porous media (under review by *Vadoze Zone Journal*)
- Thorne D.T. Jr., K.J. Bardsley, J.S. Lee and **M.C. Sukop**. Hydrostatic Boundary Conditions for Density-Dependant Flow Simulations with Lattice Boltzmann Methods (under review by *International Journal of Modern Physics C*)

### ***Proceedings***

- Sukop, M.C.**, S. Anwar, J.S. Lee, K.J. Cunningham, and C.D. Langevin, 2008, Modeling Ground-water Flow and Solute Transport in Karst with Lattice Boltzmann Methods, Proceedings of the U.S. Geological Survey Karst Interest Group Workshop, May 27-29, 2008, Bowling Green, Kentucky, Western Kentucky University Campus (in press)
- Langevin, C.D., A.M. Dausman, D.T. Thorne, and **M.C. Sukop**, 2008. Modeling Solute and Heat Transport with SEAWAT, MODFLOW and More: Ground Water and Public Policy, Golden, Colorado, May 19-21 (in press)

- Dausman, A.M., Doherty, J., Langevin, C.D., and **Sukop, M.C.**, 2008. Quantifying Data Contributions toward Reducing Predictive Uncertainty in a Variable-Density Flow and Solute/Heat Transport Model, MODFLOW and More: Ground Water and Public Policy, Golden, Colorado, May 19-21 (in press)
- Dausman, A.M., Langevin, C.D., and **Sukop, M.C.**, 2007, Simulation of submarine groundwater discharge salinity and temperature variations: implications for remote detection, in Sanford, W., Langevin, C.D., Polemio, M., and Povinec, P., eds., 2007, A new focus on groundwater-seawater interactions: IAHS Publication 312, Oxfordshire, United Kingdom, p. 272-280.
- Bardsley, K.J., S. Anwar, and **M.C. Sukop**, 2006. Simultaneous heat and solute transport modeling of ground water with lattice Boltzmann methods. CMWR XVI - Computational Methods in Water Resources, XVI International Conference, Copenhagen, Denmark, June 19-22
- Thorne, D.T., C.D. Langevin, and **M.C. Sukop**, 2006. MODFLOW/MT3DMS-Based Simulation of Variable-Density Groundwater Flow with Simultaneous Heat and Solute Transport, CMWR XVI - Computational Methods in Water Resources, XVI International Conference, Copenhagen, Denmark, June 19-22
- Thorne, D.T. and **M.C. Sukop**, 2004. Lattice Boltzmann model for the Elder problem, In *Computational Methods in Water Resources*, Proceedings of the XVth International Conference on Computational Methods in Water Resources (CMWR XV), June 13-17, 2004, Chapel Hill, NC, USA. C.T. Miller, M.W. Farthing, W.G. Gray, and G. F. Pinder Eds. Elsevier, Amsterdam.
- Perfect, E. and **M.C. Sukop**, 1999. Modeling solute dispersion in irregularly shaped soil pores. Proceedings: Soil Structure/Carbon Workshop. Leamington, Ontario. August 23 - 25

## **Reports**

- Langevin, C.D., Thorne, D.T., Jr., Dausman, A.M., **Sukop, M.C.**, and Guo, Weixing, 2008, SEAWAT Version 4: A Computer Program for Simulation of Multi-Species Solute and Heat Transport: U.S. Geological Survey Techniques and Methods Book 6, Chapter A22, 39 p.
- Perfect, E., M.S. Coyne, V.L. Quisenberry, **M. Sukop** and L. Bejat, 1997. Measuring solute transport in structured soils using time domain reflectometry. Kentucky Water Research Institute.
- Sukop, M.** and C.G. Cogger, 1989. Retention of pesticides by alluvial soils in western Washington: experimental variables, relation to soil properties, and spatial variability. State of Washington Water Research Center, Pullman, Washington. March 1989.

## **Ph.D. Dissertation**

- Porosity, percolation thresholds, and water retention behavior of random fractal porous media. 2001. Advisor: Professor Edmund Perfect.

## ***M.S. Thesis***

Retention of pesticides by alluvial soils in western Washington: experimental variables, relation to soil properties, and spatial variability. 1989. Advisor: Professor Craig Cogger.

## ***Published Abstracts***

- Sukop, M.C.**, H. Huang, K.J. Cunningham, P.F. Alvarez (2008), High-Resolution X-ray Computed Tomography of Macroporous Karst for Permeability Measurement and Non-Darcian Flow via Lattice Boltzmann Models, EOS Trans. AGU, 89(23), Jt. Assem. Suppl., Abstract NS23A-04
- Anwar, S. and **M. Sukop** (2008), Lattice Boltzmann Methods for Fluid and Solute Transport Modeling in Karst Aquifers, EOS Trans. AGU, 89(23), Jt. Assem. Suppl., Abstract H33D-08
- Bardsley, K.J. and **M. C. Sukop** (2008), Simulating density-dependent flows using the lattice Boltzmann method, EOS Trans. AGU, 89(23), Jt. Assem. Suppl., Abstract H53B-08
- Lee, J.S., **M.C. Sukop**, and K.J. Cunningham (2008), Lattice Boltzmann Methods Applied to Three-Dimensional Virtual Cores Constructed from Digital Optical Borehole Images of a Karst Carbonate Aquifer, EOS Trans. AGU, 89(23), Jt. Assem. Suppl., Abstract NS23A-03
- Biswas, H., A. Melesse, M. McClain, and **M. Sukop** (2008), Groundwater flow modeling using PMWIN model in the Wakal River basin, Rajasthan, India, EOS Trans. AGU, 89(23), Jt. Assem. Suppl., Abstract H41B-04
- Variano, E.A., D.T.Ho, V. Engel, P.J. Schmieder, M.C. Reid, **M. Sukop** (2008), Physical and numerical modeling of flow through the Everglades, 2008 Ocean Sciences Meeting: From the Watershed to the Global Ocean, 2-7 March 2008, Orlando, Florida, USA, Co-sponsored by the American Society of Limnology and Oceanography, the American Geophysical Union, The Oceanography Society, and the Estuarine Research Federation, Meeting Abstracts p. 472
- Sukop, M.C.**, H. Huang, C.L. Lin, M.D. Deo, K. Oh, J.D. Miller (2007), Validation of Lattice Boltzmann Modeling of Multiphase Fluids in Porous Media with Micro-X-ray Tomography Data, EOS Trans. AGU, 88 (52), Fall Meet. Suppl., Abstract H42C-07
- Anwar, S. and **M.C. Sukop** (2007), Groundwater flow modeling using Lattice Boltzmann models, EOS Trans. AGU, 88 (52), Fall Meet. Suppl., Abstract H33D-1624
- Cihan, A., J.S. Tyner, E. Perfect, **M. Sukop**, and H. Haibo (2007), Analytical and Lattice Boltzmann Predictions of Intrinsic Permeability for Deterministic and Randomized Fractal Porous Media, EOS Trans. AGU, 88 (52), Fall Meet. Suppl., Abstract H53E-1465
- Anwar, S. and **M.C. Sukop**. 2007 Verification of lattice Boltzmann models for solute transport modeling in karst aquifers. International Conference on Mesoscopic Methods in Engineering and Science. Germany, July 16-20
- Sukop, M.C.**, P.F. Alvarez, K.J. Cunningham, and C.D. Langevin. 2007. Investigating Non-Darcy Flow in Highly Porous Aquifer Materials with Lattice Boltzmann Methods. International Conference on Mesoscopic Methods in Engineering and Science, Munich, Germany, July 16-20 (Oral presentation)

- Sukop, M.C.**, H. Huang, P.F. Alvarez, K.J. Cunningham, and C.D. Langevin. 2007. Applying Lattice Boltzmann, Fractal, and Geostatistical Methods to Karst. PEDOFRACT 2007, International Workshop on Scale Dependences in Soil and Hydrologic Systems. El Barco de Avila, Spain, July 3-6 (Oral presentation)
- Sukop, M.C.** and H. Huang, 2007. Relative Permeabilities of Fractal Porous Media with Lattice Boltzmann Methods. PEDOFRACT 2007, International Workshop on Scale Dependences in Soil and Hydrologic Systems. El Barco de Avila, Spain, July 3-6 (Oral presentation)
- Dausman, A.M., C. Langevin, and **M.C. Sukop**. 2007. Utilizing a Variable-Density Numerical Model with Flow Dependence on Temperature and Salinity to Guide the Collection of Submarine Groundwater Discharge Data. International Union of Geodesy and Geophysics XXIV General Assembly, Perugia Italy, July 2-13
- Sukop, M.C.**, C.D. Langevin, and K.J. Cunningham (2006), Modeling Flow and Solute Transport in Karst Aquifers with Lattice Boltzmann Methods, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract H42C-08 (Oral presentation)
- Anwar, S., A. Cortis, **M.C. Sukop**, (2006), Lattice Boltzmann Simulation of Solute Transport in Heterogeneous Porous Media with Conduits to Estimate Macroscopic Continuous Time Random Walk Model Parameters, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract H21C-1384
- Bardsley, K.J., D.T. Thorne, J.S. Lee, and **M.C. Sukop** (2006), An Implementation of Hydrostatic Boundary Conditions for Variable Density Lattice Boltzmann Methods, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract H33D-1535
- Dausman, A.M., C.D. Langevin, **M.C. Sukop**, and V. Walsh (2006), Development and Calibration of a Variable-Density Numerical Model of a Deep-well Injection Site near the Southeastern Florida Coast, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract H33D-1538
- Dausman, A.M., C. Langevin, V. Walsh and **M.C. Sukop**. 2006. Modeling the Potential for Plume Migration from a Deep Well Injection Site. National Ground Water Association Ground Water Summit, San Antonio, Texas, April 23-26
- Sukop, M.C.**, S. Anwar, K.J. Bardsley, 2005, Transport in large scale porous media with conduits via lattice Boltzmann models, Eos Trans. AGU, 86(52), Fall Meet. Suppl., Abstract H42A-04 (Oral presentation)
- Gentry, R.W., E. Perfect, and **M.C. Sukop**, 2005. Effective Hydraulic Conductivity Scaling in a 2-Dimensional Geometrical Multifractal Model for Aquifer Heterogeneity, Eos Trans. AGU, 86(52), Fall Meet. Suppl., Abstract H11D-1289
- Sukop, M.C.**, D. T. Thorne, and S. Anwar. 2004. Lattice Boltzmann Methods and Their Boundary Conditions for Solute Transport. EOS Trans. AGU, 85(47), Fall Meet. Suppl., Abstract H32A-07 (Oral presentation)
- Sukop, M.C.** and D. Thorne. 2004. Lattice Boltzmann Modeling for ASR Systems. Aquifer Storage Recovery IV, Tampa FL, April 15-16.
- Chau, J., D. Or, S. B. Jones, and **M. C. Sukop**. 2004. Lattice Boltzmann Modeling of Gaseous Diffusion in Unsaturated Porous Media under Variable Gravity Conditions. 2004 Joint

Assembly: AGU, the Canadian Geophysical Union (CGU) and the Society of Exploration Geophysicists (SEG) - 17-21 May 2004, Montreal, Canada

**Sukop, M.C.** and D. Or. 2003. Lattice Boltzmann Models for Diffusion in Partially Saturated Porous Media under Variable Gravity, Soil Science Society of America Annual Meeting, Denver, Colorado. (Oral presentation).

**Sukop, M.C.** and D. Or. 2002. Unsaturated Hydraulic Conductivity of Fracture and Capillary Networks via Lattice Boltzmann Methods. EOS Transactions 83(47) H62G-12. (Oral presentation)

**Sukop, M.C.** and D. Or. 2001. Application of Lattice Boltzmann Method to Simulation of Liquid-Vapor Interfacial Configuration in Angular Pores. EOS Transactions 82(47) H12B-0292.

**Sukop, M.C.** and E. Perfect. 2000. Multifractal Behavior of Heterogeneous Fractal Porous Media. EOS Transactions 81(48) NG71B-16.

Perfect E. and **M.C. Sukop**. 2000. Statistical Relations between Water Retention Parameters and Solute Dispersivity for Short, Undisturbed Soil Cores. EOS Transactions 81(48) H51D-12.

**Sukop, M.C.**, G-J. van Dijk, E. Perfect, W.K.P van Loon. 2000. Percolation Thresholds in 2-Dimensional Prefractal Models of Porous Media. *Agronomy Abstracts*. (Oral presentation)

Perfect, E. and **M.C. Sukop**. 1998. Models to predict the dispersion of non-reactive solutes from pore characteristics. *Agronomy Abstracts*.

Mulla, D.J., **M.C. Sukop**, C. Cogger, and L.W. Getzin. 1989. Field Scale Variability: Effects on Pesticide Transport. *Agronomy Abstracts*.

**Sukop, M.** and C. Cogger. 1988. Spatial Structure of Pesticide Sorption Coefficients. *Agronomy Abstracts*.

**Sukop, M.** and C. Cogger. 1987. Pesticide Transport in Unsaturated Soil Columns. *Agronomy Abstracts*.

### ***Selected Presentations***

**Invited:** Lattice Boltzmann Methods: 21<sup>st</sup> Century Modeling Tool, Earth and Planetary Sciences Department, University of Tennessee-Knoxville, September 6, 2007.

Investigating Non-Darcy Flow in Highly Porous Aquifer Materials with Lattice Boltzmann Methods. International Conference on Mesoscopic Methods in Science and Engineering, Munich, Germany, July 16-20, 2007

**Invited:** Relative Permeabilities of Fractal Porous Media with Lattice Boltzmann Methods, PEDOFRACT 2007, International Workshop on Scale Dependences in Soil and Hydrologic Systems. El Barco de Avila (Spain), July 3-6, 2007

**Invited:** Applying Lattice Boltzmann, Fractal, and Geostatistical Methods to Karst, PEDOFRACT 2007, International Workshop on Scale Dependences in Soil and Hydrologic Systems. El Barco de Avila (Spain), July 3-6, 2007

- Invited:** Lattice Boltzmann Methods: 21<sup>st</sup> Century Modeling Tool, Mechanical Engineering Department, University of Maryland Baltimore County, February 23, 2007.
- Invited:** Lattice Boltzmann Simulation of Solute Transport in Heterogeneous Porous Media with Conduits to Estimate Macroscopic Continuous Time Random Walk Model Parameters, International Conference on Mesoscopic Methods in Science and Engineering, Hampton VA, July 26, 2006
- Lattice Boltzmann Methods: 21<sup>st</sup> Century Modeling Tool, Geotopics seminar, University of Miami, Miami Florida, November 14, 2005
- Lattice Boltzmann methods for single and multiphase fluids and solute transport, Florida International University Civil and Environmental Engineering graduate environmental engineering seminar, Miami Florida, April 4, 2005
- Lattice Boltzmann methods and aquifer storage and recovery applications, Department of Geology, University of South Florida, Tampa Florida, October 15, 2004.
- Lattice Boltzmann methods for single and multiphase fluid and mass transport simulation, Physics Department Colloquium, Florida International University, Miami Florida, October 1, 2004.
- Lattice Boltzmann methods for multiphase fluids, Mechanical and Materials Engineering Department, Florida International University, Miami Florida, January 16, 2004
- Lattice Boltzmann models for gaseous diffusion in partially saturated porous media under variable gravity. Soil Science Society of America Annual Meeting, Denver Colorado, November 3, 2003
- Ground water and solute transport modeling and new approaches for fluids and porous media, Florida International University, Miami Florida, February 19, 2003
- Single component, multiphase Lattice Boltzmann models (LBM) in invasion percolation. Sixth International Conference on the Electrical Transport and Optical Properties of Inhomogeneous Media, Snowbird UT, July 15-19, 2002
- Simulating water/water vapor equilibria in porous media: single component/multiphase Lattice Boltzmann method. Western Regional Research project W-188 Technical Committee Annual Meeting, Las Vegas, NV. January 3-4, 2002
- Application of lattice gas cellular automata to determine soil moisture characteristics of pore spaces of known fractals. University of Kentucky Department of Agronomy Soil Science Seminar. Lexington Kentucky, September 1, 2000
- Introduction to fractals and some potential applications. Unit  de Science du Sol - INRA, Avignon, France. November 5, 1999
- Scale-dependent dispersivities and the fractional convection - dispersion equation. Symposium - Issues of Scale and Spatial variability as Related to Solute Transport. IEG-73 - Information Exchange Group: "Classifying Soils for Solute transport as Affected by Soil Properties and Landscape Position." Lexington, Kentucky April 26, 1999
- Introduction to fractals and some potential applications. University of Kentucky Department of Agronomy Soil Science Seminar. Lexington Kentucky, March 5, 1999
- Injection well testing at the Air Force's Global Communications Facility in Davis, California. University of Kentucky Department of Geological Sciences Seminar. Lexington Kentucky, February 5, 1998
- Spatial variability of soil physical properties and metalaxyl transport parameters. University of Kentucky Department of Agronomy Soil Science Seminar, Lexington Kentucky, December 5, 1997
- Contaminant transport and attenuation. Presented to Thurston County Groundwater Advisory Committee, Olympia, WA. September 15, 1988

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# ***Appointments, Teaching, Service, Awards***

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## ***Appointments/Positions Held***

**Assistant Professor:** 2003-present, Florida International University, Department of Earth Sciences

**Postdoctoral Fellow:** 2002-2003, University of Connecticut; 2001-2002, Utah State University

**Research Assistant,** 1997-2001, University of Kentucky

**Substitute Geology Instructor,** 1996-1997, Shasta-Tehama-Trinity Joint Community College District

**Hydrogeologist/Soil Scientist,** 1989-1997, CH2M Hill Engineering

**Research Assistant,** 1986-1989, Washington State University

**Hydrogeologist,** 1984-1986, Donohue and Associates Engineering (now Earth Tech)

## ***Postdoctoral Supervision***

Dr. Haibo Huang (2006-2007) Currently Associate Professor, Department of Modern Mechanics, University of Science and Technology of China, Hefei, Anhui province, China, 230026

Dr. Danny Thorne (2003-2005). Currently Assistant Professor, Georgetown College, Georgetown Kentucky

## ***Graduate Student Advising***

Shadab Anwar, PhD candidate

Katie Bardsley, PhD candidate

Alyssa Dausman, PhD candidate

Jeff Lee, PhD student

Jozsef Garai, PhD (graduated Fall 2007; Dissertation: Thermodynamic description and phase transformation of highly symmetrical monoatomic structures)

Pedro Alvarez, MS (graduated Summer 2007; Thesis: Lattice Boltzmann modeling of fluid flow to determine the permeability of a karst specimen)

Carmen Serpa, MS (graduated Summer 2005; Thesis: Lattice Boltzmann method simulations of flow in idealized intersections of systematic fractures and cross joints)

Zuhal Ozturk, PhD (Co-chair) Civil and Environmental Engineering (graduated Fall 2006; Dissertation: Trichloroethylene Fate and Transport Studies and Biodegradation Kinetics in the Saturated Zone)

Nenpan Tunkuda, MS candidate (committee member)

Virginia Walsh, PhD candidate (committee member)

Melroy Borges, PhD candidate (committee member)

Carlos Molinas, MS (graduated Summer 2005) (committee member)

Vincent DiFrenna, MS (graduated Summer 2005) (committee member)

Seckin Gokaltun, PhD student, Mechanical and Materials Engineering (committee member)

Ronald Gutierrez, PhD candidate, Biomedical Engineering (committee member)

Christopher Haugh, MS Biomedical Engineering (committee member) (Graduated Fall 2007; Thesis: The Influence of Anastomosis Angle and Linear Taper on an Arteriovenous Graft for Hemodialysis)

Ryan Moreno, PhD Mechanical and Materials Engineering (committee member) (Graduated Summer 2006; Dissertation: A study of branching fluid networks for enhancing the performance of thermal-fluid devices)

Ramon Moral, PhD student, Mechanical and Materials Engineering (committee member)

Vaibhav Jain, PhD student, Mechanical and Materials Engineering (committee member)

Jessica Furrer Chau, MS, Civil and Environmental Engineering, University of Connecticut (committee member) (graduated Fall 2005; Thesis: Lattice Boltzmann Studies of Forces Determining Liquid Configuration in Unsaturated Porous Media and Their Effect on Gas Diffusion)

Keqiang Xing, PhD Mechanical and Materials Engineering (committee member) (Graduated Fall 2007; Dissertation: Numerical Investigation on the Heat Transfer Enhancement using Micro/nano Phase-change Particulate Flow)

Varinia Consiglio-Yanez, MS Biomedical Engineering (committee member) (graduated Fall 2007, Capstone Project: An analysis of thrombosis using lattice Boltzmann method)

## **Teaching**

Lattice Boltzmann Summer Course (with D.T. Thorne), University of Utah, August 9 – 13, 2004

GLY-1010 (undergraduate) Introduction to Earth Science 2007

GLY-3039 (undergraduate) Environmental Geology 2005/2008

GLY-4822 (undergraduate) Introduction to Hydrogeology 2005/2006/2007/2008

GLY-5826 (graduate) Hydrogeologic Modeling 2004/2005/2006/2007

GLY-5828 (graduate) Chemical Hydrogeology 2004/2006

GLY-5994 (graduate) Introduction to Lattice Boltzmann Methods 2004/2005/2006

GLY 5931/GLY 6931 Graduate/Advanced Graduate Seminar 2003/2004/2005/2006

CE/ENVE 279 Environmental Modeling, University of Connecticut 2003

Substitute Graduate Soil Physics Instructor, Utah State University. Grade examinations. 2001

Deliver Soil Physics Laboratory, Utah State University. Grade laboratory assignments. 2001

Write, prepare, and deliver Soil Physics Laboratory, University of Kentucky. Grade laboratory assignments. 1998-1999

Substitute Introductory Geology Instructor, Shasta-Tehama-Trinity Joint Community College District, 1996 -1997

### **Informal**

Assist graduate students with solute transport modeling, solute transport experiments, adsorption studies, and World Wide Web page development

Mentor and train visiting students in fractals and computer techniques

### **Professional Service**

#### **Service to Professional Associations/Societies**

Co-convener Recent Advances in Groundwater Hydrology Session (H11), American Geophysical Union 2008 Joint Assembly, Ft. Lauderdale FL, May 27–30

Student Presentation Judge, American Geophysical Union 2007 Fall Meeting

Bio/Porous Media Flow Session Chairman, International Conference on Mesoscopic Methods in Engineering and Science, Hampton VA, July 24-28, 2006

Student Presentation Judge, American Geophysical Union 2004 Fall Meeting

Student Poster Judge, American Geophysical Union 2002 Fall Meeting

Student Research Symposium Judge, American Society of Agronomy 2000 Annual Meeting

Science Fair Judge: Lexington, KY 1999 - 2001; Redding, CA 1990 - 1997

American Society of Civil Engineers Mathcounts program presentations to 6<sup>th</sup> and 7<sup>th</sup> graders, 1990 - 1997

#### **Peer Reviewer for:**

National Science Foundation, United States Geological Survey, Austrian Science Fund, Israel Science Foundation, Water Resources Research, Journal of Hydrology, Journal of Hydrologic Engineering, Hydrogeology Journal, Vadose Zone Journal, Transport in Porous Media, Advances in Water Resources, Journal of Colloid and Interfacial Science, Journal of Physics and Chemistry of Solids, Soil Science Society of America, Journal of Environmental Quality, European Journal of Soil Science, Soil and Tillage Research, Geochemical Journal, American Society of Mechanical Engineers, Computers and Geosciences, International Journal of Thermal Sciences; Estuarine, Coastal and Shelf Science; Environmental Science and Technology, International Journal of Modern Physics C, Microfluidics and Nanofluidics, Kearney Foundation of Soil Science, American Chemical Society/Petroleum Research Fund, Non-linear Processes in Geophysics

### **Memberships**

American Geophysical Union, Hydrology Section, 1997-Present

National Ground Water Association/Association of Ground Water Scientists and Engineers, 1991-Present

International Association for Mathematical Geology, 2008-Present

### **University Service**

#### **Committees**

Member: University-Wide Inter-disciplinary Committee on Environmental Engineering, 2005-present

**Committee Chair:** Tenure-track meteorology faculty search, Earth Sciences Department, 2005

Member: Tenure-track fluids/computational sciences faculty search, Materials and Mechanical Engineering Department, 2005, 2007

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## ***Grants, Awards, and Fellowships***

- Pending: South Florida Water Management District, \$21,000, 2008-2009. Determination of Sheetflow Hydrodynamic Properties
- United States Geological Survey, \$70,000, 2008 - 2009. Lattice Boltzmann Measurement of Borehole-Scale Hydraulic Conductivity and Macroporosity of Biscayne Aquifer Materials
- United States Geological Survey, \$33,600, 2007 - 2008. Lattice Boltzmann Measurement of Hydraulic Conductivity of Digitized Macroporous Limestone Samples Representative of Highly-Porous Biscayne Aquifer Materials
- National Science Foundation, \$220,000, 2004 - 2007. Lattice Boltzmann Methods for Concentration- and Temperature-Induced Density Driven Flows
- Center for Advanced Separation Technologies, \$40,000, 2005 - 2007. Development of a 3-D Lattice-Boltzmann Model for Fluid Flow Simulation under Partially-saturated Conditions in Packed Beds of Particles
- United States Geological Survey, \$12,000, 2006 - 2007. Lattice Boltzmann Measurement of Hydraulic Conductivity of Digitized Macroporous Limestone
- United States Geological Survey, \$56,000, 2005. Addition of temperature dependent buoyancy (and other temperature dependencies) to SEAWAT
- National Aeronautics and Space Administration/National Science Foundation, University of Connecticut Postdoctoral Fellowship, 2002-2003. Lattice Boltzmann Methods
- National Aeronautics and Space Administration/National Science Foundation, Utah State University Postdoctoral Fellowship, 2001 - 2002. Lattice Boltzmann Methods
- University of Kentucky Center for Computational Sciences Fellowship, \$20,000. Parallelizing a Lattice Gas Simulator of Fluid Retention in Known Fractal Pore Spaces, 2000 - 2001
- University of Kentucky Dissertation Enhancement Award, Lattice Gas Simulation of Soil Moisture Retention in Known Fractal Pore Spaces, 1999
- University of Kentucky Research Challenge Trust Fund Fellowship, 1997 - 2000
- American Geophysical Union Travel Grant for Chapman Conference on Fractal Scaling, Non-linear Dynamics, and Chaos in Hydrologic Systems, May 12-15, 1998 in Clemson, South Carolina
- American Water Resources Association -- Washington Section Fellowship Award 1988