

Curriculum Vitae

Dr. Bojan I. Markicevic

Office

Kettering University
1700 West Third Avenue
Flint, MI 48504
Phone: (810) 341-9572
E-mail: bmarkice@kettering.edu

Home

7488 Heatherwood Drive, 2-B
Grand Blanc, MI 48439
Phone: (810) 606-0247
E-mail: bojanm11@yahoo.com

PROFESSIONAL SUMMARY

- Major in Chemical Engineering with specialization in the transfer phenomena, fluid dynamics, multiphase flow, and applied mathematics with specific research interests in porous media.
- Experienced in discrete: capillary networks, and continuum: both finite and boundary elements modeling.
- Research topics include: fuel cell, composites, droplet problem with hands on experience in experiments design, extrusion and injection molding, resin transfer molding.

EDUCATION

- UNIVERSITY OF SOUTH CAROLINA, COLUMBIA, SC
Doctor of Philosophy in Chemical Engineering, GPA 3.82, August 2001.
Advisor: Thanasis D. Papathanasiou
Thesis: *On the Transverse Permeability of Structured Porous Media.*
- UNIVERSITY OF BELGRADE, BELGRADE, YUGOSLAVIA
Master of Science in Chemical Engineering, GPA 3.88, July 1998.
Advisor: Radmila Cvijovic
Thesis: *Numerical and Experimental Modeling of the Air Pollution Distribution.*
- TECHNICAL COLLEGE, BELGRADE, YUGOSLAVIA
Bachelor of Chemical Technology, GPA 3.73, April 1993.
Advisor: Milan Mitrovic
Thesis: *Numerical and Experimental Modeling of the Capillary Catalytic Reactor.*

RESEARCH EXPERIENCE AND POSITIONS HELD

RESEARCH SCIENTIST, Kettering University, Flint, MI (April 2007 – present).

Research Topics: Development of mathematical models for the transport of liquid and vapor phases in porous media based on the discrete method of capillary network, Support of experimental efforts to create hybrid (analytical-experimental) techniques for obtaining transport properties, Validation of computational methods with experimental data.

POST-DOCTORAL RESEARCH FELLOW, Kettering University, Flint, MI (April 2006 – April 2007).

Research Topics: Development of general, three-dimensional capillary network model and solution of the droplet problem: spread, evaporation and chemical reaction in porous media (model is applicable in: catalysis, printing, composites, oil recovery, multiphase transport in fuel cell electrode).

POST-DOCTORAL RESEARCH FELLOW, Institute for Integrated Energy Systems, University of Victoria, Victoria, BC, Canada (June 2003 – March 2006).

Research Topics: Capillary network modeling and its usage in investigation of multiphase transfer phenomena in fuel cell, Relative permeability, capillary pressure and saturation prediction, Water flow mechanisms: displacement and two mobile phases flow, Water management in fuel cell gas diffusion layer obtained from static and dynamic water flow, Dynamic stability and conditions, Experimental visualization of multiphase flow in gas diffusion layer, Development of analytical procedures and parameter estimation.

POST-DOCTORAL RESEARCH FELLOW, Center for Composite Materials, University of Delaware, Newark, DE (September 2001 – May 2003).

Research Topics: Effectiveness factor of systems clear fluid/ porous medium based on momentum transfer, Fluid flow mechanisms of joined two porous media, Numerical FEM/CV solution of coupled the Darcy law and the continuity equation, Analytical solution of combined clear fluid channel/porous medium flow, Experimental investigation of the vacuum assisted composite materials processing, Filling of the two separate walls structures, Volume averaging, Flow in heterogeneous porous media, Spectral analysis.

RESEARCH ASSISTANT, University of South Carolina, Columbia, SC (August 1998 – August 2001).

Research Topics: Porous systems build-up of the fibers bundled into the tows, The inertial flow through the fibrous porous media build-up of the fibers of unequal size, Permeability of fibrous porous media with permeable tows with two distinct tow permeabilities, Analytical solution of the coupled Brinkman and the Stokes equations (lubrication approximation), Dimensionless analysis, Integral formulations of the Stokes and the Navier Stokes equations, Fundamental solution of the Stokes equation, Validity of the Ergun and the Forchheimer equations.

RESEARCH ASSISTANT, University of Belgrade, Belgrade, Yugoslavia (August 1996 - July 1998).

Research Topics: Numerical modeling and experimental measurements in hydraulic channel of the air pollution distribution, Diffusion in infinite medium, Random walk models, Digital image processing.

RESEARCH ASSISTANT, Technical College, Belgrade, Yugoslavia (October 1992 - April 1993).

Research Topics: Numerical and experimental modeling of micro capillary catalytic reactor, Developed the semi-analytic step-to-step model for parabolic PDEs.

UNDERGRADUATE RESEARCH EXPERIENCE, AGFA, Leverkusen, Germany (August - September 1992) in synthesis and characterization of the photo sensitive compounds; Technical University, Budapest, Hungary (September - October 1990) in simulations of the distillation column for separation of the binary mixture (benzene - chlorobenzene).

INDUSTRIAL EXPERIENCE

DESIGN ENGINEER, SPEKTAR, Cacak, Yugoslavia (June 1996 - July 1998).

Design Project: Designed an extrusion line, serving as a team member focused toward the causes and reduction of the line mass flow rate oscillations, Resulted in an increase to company income of over one million per year.

DESIGN ENGINEER, TRZ, Kragujevac, Yugoslavia (May 1993 - June 1996).

Design Projects: Worked with a team of engineers to design the batch reactor, assuming responsibility for the mixing and heat transfer aspects of the project; Designed a heat exchanger, focusing on the heat transfer rate for different operating conditions.

TEACHING EXPERIENCE

TEACHING ASSISTANT, USC Dept. of Chemical Engineering, Columbia, SC (August 1998 - May 2001).

- Graded assignments and held office hours for undergraduate Heat Transfer and graduate Advanced Fluid Flow Analysis courses.
- Worked as Lab Instructor for Unit Operations being responsible for experiments, calculations and reports.

PUBLICATIONS

1. B. Markicevic and T. D. Papathanasiou, The Hydraulic Permeability of Dual Porosity Fibrous Media, *Journal of Reinforced Plastics and Composites*, **20**, 871-880, 2001.
2. T. D. Papathanasiou, B. Markicevic and E. D. Dendy, A Computational Evaluation of the Ergun and Forchheimer Equations for Fibrous Porous Media, *Physics of Fluids*, **13**, 2795-2804, 2001.
3. B. Markicevic and T. D. Papathanasiou, On the Apparent Permeability of Regular Arrays of Nonuniform Fibers, *Physics of Fluids*, **14**, 3347-3349, 2002.
4. B. Markicevic and T. D. Papathanasiou, A Model for the Transverse Permeability of Bi-material Layered Fibrous Preforms, *Polymer Composites*, **24**, 68-82, 2003.
5. B. Markicevic and T. D. Papathanasiou, An Explicit Physics-Based Model for the Transverse Permeability of Multi-Material Dual Porosity Fibrous Media, *Transport in Porous Media*, **53**, 265-280, 2003.
6. B. Markicevic, D. Heider and S. G. Advani, Filling of a System of Channels and Porous Medium: An Effectiveness Factor Based on Momentum Transfer, *Journal of Porous Media*, **6**, 223-233, 2003.
7. B. Markicevic, D. Litchfield, D. Heider and S. G. Advani, Role of Flow Enhancement Network during Filling of Fibrous Porous Media, *Journal of Porous Media*, **8**, 281-297, 2005.
8. B. Markicevic, D. Heider, S. G. Advani and S. Walsh, Stochastic Modeling of Preform Heterogeneity to Address Dry Spots Formation in the VARTM Process, *Composites: Part A*, **36**, 851-858, 2005.
9. B. Markicevic and N. Djilali, Multi-scale Modeling in the Porous Media: Computation of Relative Permeability, *Physics of Fluids*, **18**, Art. No. 033101, 2006.
10. B. Markicevic, A. Bazylak and N. Djilali, Determination of transport parameters for multiphase flow in porous gas diffusion electrodes using a capillary network model, *Journal of Power Sources*, **172**, 706-717, 2007.
11. H. K. Navaz, E. Chan, and B. Markicevic, Convective Evaporation Model of Sessile Droplets in a Turbulent Flow-Comparison with Wind Tunnel Data, *International Journal of Thermal Sciences*, **47**, 963-971, 2008.
12. B. Markicevic and H. K. Navaz, Numerical Solution of Wetting Fluid Spread into Porous Media, accepted in *International Journal of Numerical Method for Heat and Fluid Flow*.
13. A. Bazylak, S. Berejnov, B. Markicevic, D. Sinton and N. Djilali, Numerical and Experimental Microfluidic Pore Network Designs for Controlled Water Transport in GDLs, accepted in *Electrochimica Acta*.

14. H. K. Navaz, B. Markicevic, A. R. Zand, Y. Sikorski, E. Chan and T. G. D'Onofrio, Sessile Droplet Spread into Porous Substrates - Determination of Capillary Pressure Using a Continuum Approach, accepted in *Journal of Colloid and Interface Science*.
15. B. Markicevic and N. Djilali, Dependence of Single- and Multiphase Permeability on Capillary Pressure: A Unified Approach, in revision.
16. B. Markicevic, A. Nalla, H. K. Navaz, D. Heider, S. Walsh and S. G. Advani, Boundary Layer Thickness in Dual Potential Fluid Flow through Porous Medium, in revision.
17. B. Markicevic and H. K. Navaz, Primary and Secondary Droplet Spread into Porous Media, in revision.
18. B. Markicevic and N. Djilali, A Novel Scheme in Network Modeling of Multiphase Flow through Porous Media, ready for submission.
19. B. Markicevic, and N. Djilali, A dynamic capillary network model of in-plane water transport in a fuel cell gas diffusion layer, ready for submission.
20. B. Markicevic, and N. Djilali, Solution of in-thickness water flow through the gas diffusion layer using pore network model with the dynamic interface conditions, ready for submission.
21. B. Markicevic, H. Li, Y. Sikorski, A. R. Zand, M. Sanders and H. K. Navaz, Infiltration Time and Imprint Shape of a Sessile Droplet Imbibing Porous Medium, ready for submission.

PRESENTATIONS

1. B. Markicevic, H. Li, A. R. Zand, and H. K. Navaz, Capillary Force Driven Spread of Wetting Liquid into Porous Medium, submitted to The 61st Annual Meeting of the Division of Fluid Dynamics of the American Physical Society (APS-DFD), San Antonio, TX, November (2008).
2. B. Markicevic, H. Navaz, A. Zand, H. Li, L. Beholz, C. Rincon, Y. Sikorski, and M. Sanders, Determination of relative permeability and capillary pressure from unsaturated flow through porous medium, to be presented at Chemical and Biological Defense Conference (CBDC), New Orleans, LA, November (2008).
3. A. Zand, H. Li, J. Meyers, E. Bowden, B. Markicevic, Y. Sikorski, M. Sanders, H. Navaz, Experimental approach to measurements of effective vapor diffusion coefficients in porous Media, to be presented at CBDC, New Orleans, LA, November (2008).
4. A. Zand, H. Li, L. Beholz, J. Meyers, E. Bowden, K. Hoff, B. Markicevic, Y. Sikorski, M. Sanders, H. Navaz, Experimental approach to measurements of Adsorption Energies and Reaction Rates of Chemicals inside Porous Media, to be presented at CBDC, New Orleans, LA, November (2008).
5. H. K. Navaz, B. Markicevic, A. Zand, Y. Sikorski, M. Sanders and T. D'Onofrio, Mass Transport of a Sessile Droplet in Porous Materials/ Development of a Capillary Pressure Function, WIT Conference, Maribor, Slovenia, July (2008).
6. H. Li, A. R. Zand, J. Meyers, E. Bowden, L. Beholz, B. Markicevic, Y. Sikorski, M. S. Sanders and H. K. Navaz, Measurements of Effective Vapor Diffusion Coefficients in Porous Substrates, Central Regional Meeting of the American Chemistry Society, Columbus, OH, June (2008).
7. Bazylak, A., Berejnov, V., Markicevic, B., Sinton, D., Djilali, N. A microfluidic pore network approach to investigate water transport in fuel cell porous transport layers, The Sixth International ASME Conference on Nanochannels, Microchannels and Minichannels, ICNMM2008-62349, Darmstadt, Germany, June (2008).
8. H. K. Navaz and B. Markicevic, Primary and secondary spread of wetting droplet into porous medium, The 60th APS-DFD, Salt Lake City, UT, November (2007).

9. B. Markicevic, A. Zand, Y. Sikorski, M. Sanders and H. Navaz, Experimental and Numerical Predictions of Phase Permeability in Porous Media, 2007 Chemical and Biological Information Systems Conference (CBIS), Austin, TX, January 8-11, (2007).
10. H. Navaz, A. Zand, B. Markicevic, Y. Sikorski, M. Sanders and E. Chan, Scalable Transport Models for Non-Evaporating and Evaporating Sessile Droplets within Porous Substrates, 2007 CBIS Conference, Austin, TX, January 8-11, (2007).
11. B. Markicevic, H. Navaz, A. Zand, Y. Sikorski, and M. Sanders, "The Fate of Chemical Agents Droplet (Sessile) on Porous Substrates", submitted to 2006 Scientific Conference on Chemical & Biological Defense Research, Hunt Valley, MD, November (2006).
12. H. K. Navaz and B. Markicevic, Wetting droplet spread into porous medium: A micro-force balance capillary network solution, The 59th APS-DFD, Tampa, FL, November (2006).
13. B. Markicevic, A. Nalla, D. Heider and S. G. Advani, Boundary Layer Thickness in Dual Potential Fluid Flow through Porous Medium, The 59th Annual Meeting of APS-DFD, Tampa, FL, November (2006).
14. B. Markicevic, N. Djilali and Z. S. Liu, A unified expression for the dependence of single- and multiphase permeability on capillary pressure, The 58th Annual Meeting of APS-DFD, Chicago, IL, November (2005).
15. B. Markicevic and N. Djilali, Relative Permeability and Capillary Pressure for Two Phase Flow in Porous Media: A Capillary Network Analysis, The International Green Energy Conference (IGEC-1), Waterloo, ON, June (2005).
16. B. Markicevic and N. Djilali, Continuum and Discrete Modeling in Porous Media: Relative Permeability Prediction, The 57th Annual Meeting of APS-DFD, Seattle, WA, November (2004).
17. B. Markicevic, D. Heider, S. T. Holmes, P. Handel, P. Minguet, J. W. Gillespie, Jr. and S. G. Advani, Numerical Investigation of Mold Filling of a Composite Part with Impermeable Core, The 17th Technical Conference of the American Society for Composites, West Lafayette, IN October (2002).
18. B. Markicevic and T. D. Papathanasiou, The Effect of Fiber Size and Fluid Inertia on the Permeability of Fibrous Media, SES 2000, The 37th Annual Technical Meeting Society of Engineering Science, Columbia, SC, August (2000).
19. B. Markicevic and T. D. Papathanasiou, The Hydraulic Permeability of Dual Porosity Fibrous Preforms, SPE - ANTEC 2000, 58th Technical Conference, Orlando, FL, May (2000).
20. B. Markicevic, J. Desjardins and T. D. Papathanasiou, The Influence of Lattice Inhomogeneity and Fluid Inertia on the Permeability of Fibrous Preforms, ESAFORM 2000, Studgart, Germany, April (2000).

PROFESIONAL SOCIETIES

American Physical Society, Society of Plastics Engineers, American Society for Composites.

REVIEWER

Composites. Part A., Journal of Fluid Engineering.

LANGUAGES

Serbish, English, reading proficiency in Russian.