

### **Jay M. Khodadadi, Ph.D.**

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#### **A. Education**

University of Illinois at U-C, Mechanical Engineering, BSME, 1980.

University of Illinois at U-C, Mechanical Engineering, MSME, 1982.

University of Illinois at U-C, Mechanical Engineering, Ph.D., 1986.

#### **B. Professional Experience**

Alumni Professor, Auburn University, 2010-2015.

Professor, Auburn University, 2001-present.

Associate Professor, Auburn University, 1992-2001.

Assistant Professor (tenure-track), Auburn University, 1987-1992.

Visiting Instructor, University of Illinois at U-C, 1986-1987.

#### **C. Research Interests**

Fluid/Thermal Sciences, Phase Change, Thermal Storage, Microfluidics, Nanofluids, NEPCM.

#### **D. Research Awards**

- Recipient of the **1991 DOW Outstanding Young Faculty Award** for the Southeastern section of the American Society for Engineering Education (ASEE),
- Recipient of a **1993 Ralph R. Teetor Educational Award** of the Society of Automotive Engineers,
- Recipient of a **1994 Clyde A. Sluhan Outstanding Young Manufacturing Engineer Award** of the Society of Manufacturing Engineers,
- Recipient of the **1997 Division of Heat Transfer Best Paper Award** of the **American Society of Mechanical Engineers (ASME)**,
- Recipient of the **2000 Research Unit Award for Outstanding Contribution in Research**, Southeastern section of the ASEE.

#### **E. Publications and Presentations**

Dr. Khodadadi has 54 full-length research papers and 110 conference presentations to his credit, dating back to 1984. Seven (7) full-length research papers are under review as of early April 2012. The journal papers published since 2004 are listed below:

- Khodadadi, J. M., and X. K. Lan, "Invited Paper: CFD Analysis of the Trajectory of Inclusions in the Mold of Continuous Casters," *Progress in Computational Fluid Dynamics*, Special Issue on CFD Modeling of Metallurgical Processes, Vol. 4, No. 1, pp. 1-11, 2004.
- Shi, X., and J. M. Khodadadi, "Fluid Flow and Heat Transfer in a Lid-Driven Cavity due to an Oscillating Thin Fin: Transient Behavior," *Transactions of the ASME, Journal of Heat Transfer*, Vol. 126, No. 6, pp. 924-930, 2004.
- Shi, X., and J. M. Khodadadi, "Periodic State of Fluid Flow and Heat Transfer in a Lid-Driven Cavity due to an Oscillating Thin Fin," *International Journal of Heat and Mass Transfer*, Vol.

- 48, No. 25-26, pp. 5323-5337, 2005.
- Lee, C., E-H Yang, S. M. Saeidi, and J. M. Khodadadi, "Fabrication, Characterization and Computational Modeling of a Piezoelectrically-Actuated Microvalve for Liquid Flow Control," *Journal of MicroElectroMechanical Systems*, Vol. 15, No. 3, pp. 686-696, 2006.
  - Saeidi, S. M., and J. M. Khodadadi, "Forced Convection in a Square Cavity with Inlet and Outlet Ports," *International Journal of Heat and Mass Transfer*, Vol. 49, No. 11-12, pp. 1896-1906, 2006.
  - Johnson, C. A., J. M. Khodadadi, and E-H Yang, "Modeling of Frictional Gas Flow Effects in a Piezoelectrically-Actuated Low Leak-Rate Microvalve under High-Pressure Conditions," *Journal of Micromechanics and Microengineering*, Vol. 16, No. 12, pp. 2771-2782, 2006.
  - Yang, E-H, C. Lee, and J. M. Khodadadi, "Development of MEMS-Based Piezoelectric Microvalve Technologies," *Sensors and Materials*, Vol. 19, No. 1, pp. 1-18, 2007.
  - Saeidi, S. M., and J. M. Khodadadi, "Flow Field and Heat Transfer in a Square Cavity with Inlet and Outlet Ports Due to Incoming Flow Oscillation," *International Journal of Heat and Mass Transfer*, Vol. 50, No. 3-4, pp. 530-538, 2007.
  - Khodadadi, J. M., and S. F. Hosseini-zadeh, "Nanoparticle-Enhanced Phase Change Materials (NEPCM) with Great Potential for Improved Thermal Energy Storage," *International Communications in Heat and Mass Transfer*, Vol. 34, No. 5, pp. 534-543, 2007. [This paper earned the No. 1, 3, 3, 12, 18 and 25 Download Rankings for six (6) consecutive 3-month periods from April-June, 2007 to July-September, 2008.]
  - Duggirala, R. K., C. J. Roy, S. M. Saeidi, J. M. Khodadadi, D. R. Cahela, and B. J. Tatarchuck, "Pressure Drop Predictions in Microfibrous Materials using Computational Fluid Dynamics," *Transactions of the ASME, Journal of Fluids Engineering*, Vol. 130, No. 7, 071302, 13 pages, 2008.
  - Tan, F. L., S. F. Hosseini-zadeh, J. M. Khodadadi, and L. Fan, "Experimental and Computational Study of Constrained Melting of Phase Change Materials (PCM) inside a Spherical Capsule," *International Journal of Heat and Mass Transfer*, Vol. 52, No. 15-16, pp. 3464-3472, 2009.
  - Shih, Y-C, J. M. Khodadadi, K-H Weng, and A. Ahmed, "Periodic Fluid Flow and Heat Transfer in a Square Cavity due to an Insulated or Isothermal Rotating Cylinder," *Transactions of the ASME, Journal of Heat Transfer*, Vol. 131, No. 11, 111701, 11 pages, 2009.
  - Duan, Y., S. F. Hosseini-zadeh, and J. M. Khodadadi, "Effects of Insulated and Isothermal Baffles on Pseudosteady-State Natural Convection inside Spherical Containers," *Transactions of the ASME, Journal of Heat Transfer*, Vol. 132, No. 6, 062502, 10 pages, 2010.
  - Rostamani, M., S. F. Hosseini-zadeh, M. Gorji, and J. M. Khodadadi, "Numerical Study of Turbulent Forced Convection Flow of Nanofluids in a Long Horizontal Duct Considering Variable Properties," *International Communications in Heat and Mass Transfer*, Vol. 37, No. 10, pp. 1426-1431, 2010.
  - Fan, L., and J. M. Khodadadi, "Thermal Conductivity Enhancement of Phase Change Materials for Thermal Energy Storage: A Review," *Renewable and Sustainable Energy Reviews*, Vol. 15, No. 1, pp. 24-46, 2011.
  - Sourtiji, E., S. F. Hosseini-zadeh, M. Gorji-Bandpy, and J. M. Khodadadi, "Computational Study of Turbulent Forced Convection Flow in a Square Cavity with Ventilation Ports," *Numerical Heat Transfer: Part A*, Vol. 59, No. 12, pp. 954-969, 2011.
  - Fan, L., and J. M. Khodadadi, "A Theoretical and Experimental Investigation of Unidirectional Freezing of Nanoparticle-Enhanced Phase Change Materials," to appear in

the **Transactions of the ASME, Journal of Heat Transfer**, 2012, 35 pages of manuscript.

- Fan, L., and J. M. Khodadadi, "An Experimental Investigation of Enhanced Thermal Conductivity and Expedited Unidirectional Freezing of Cyclohexane-Based Nanoparticle Suspensions Utilized as Nano-Enhanced Phase Change Materials (NePCM)," to appear in the **International Journal of Thermal Sciences**, 2012, 31 pages of manuscript.

#### **F. Current Research Grants**

- "Nanostructure-Enhanced Phase Change Materials," supported by the **US Department of Energy EPSCoR**, \$2.5M for 4 years (August 15, 2009 to August 14, 2013), PI.

#### **G. Research Funding History**

- 38 completed grants/contracts (>**\$1,900,000**) supported by: Alabama Space Grant Consortium, Containerless Research, ALCOA, AU, Cray Research, Dresser-Rand Corporation, DoE/EPSCoR, General Dynamic, Memtec Fluid Dynamics, NASA, NSF, ONR, U. S. Department of State, US Forest Service.

#### **H. Advised Graduate Students/Researchers**

- A total of 32 (2 PostDocs, 10 PhD, 9 MS and 11 MME) have been advised/ supported.
- Member of the examining committees of 47 (13 PhD, 23 MS and 11 MME) other graduate students (Aerospace Engineering, Chemical Engineering, Mathematics and Mechanical Engineering Departments)

#### **I. Patent Applications**

- U.S. Prov. Pat. Application on Nanostructure Enhanced Phase Change Materials (2009).
- US Patent on Thermal Management of Liquid Storage Containers (2008).

#### **J. Other Notable Affiliations/Activities**

##### **Review Board of Journals:**

- Metallurgical Transactions (1999-2007),
- Associate Technical Editor, Journal of Heat Transfer (2004-2007).

**Int'l. Advisory Board**, Emirates Journal for Eng. Research (2007-2009).

**Member of the US Scientific Committee**, 14th International Heat Transfer Conference, Washington, DC, August 8-13, 2010.

**Reviewer** for proposals for the National Sciences Foundation (various programs), AU's Research Grant-in-Aid Committee, Canadian Research Council, Czech Research Foundation, Hong Kong Research Grants Council, Georgian National Science Foundation, Israel Ministry of Science and Technology, MITCSNCE of Canada, Petroleum Research Fund, Singapore Government, US Civilian R&D Foundation.