

Daniel K. Harris

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EDUCATION

- PhD 1997 Mechanical Engineering, Purdue University
- MS 1992 Applied Mathematics, Johns Hopkins University
- BS 1984 Mechanical Engineering, University of Maryland

EXPERIENCE AND EMPLOYMENT RECORD

- 2003 - present: Associate Professor, Auburn University
- 1997 – 2003: Assistant Professor, Auburn University
- 1994 - 1997: Graduate Research Assistant, Purdue University
- 1991 – 1993: Thermal Analyst, Engineering, Economics & Research Corporation (EER)
- 1989 – 1991: Senior Engineer, Fairchild Space Corporation, Germantown, Maryland
- 1985 - 1989: Design Engineer, Westinghouse Defense Electronics, Linthicum, Maryland

PROFESSIONAL INVOLVEMENT

- ASME
- Session Chair: Southeastern Conference on Theoretical and Applied Mechanics, April 2000
- Session Vice-Chair: Refrigeration and Compressor Conference, July 1996
- Session Vice-Chair: Annual International Appliance Technical Conference May 1996.
- Session Vice-Chair: Refrigeration and Compressor Conference, Purdue University, 1994.

RESEARCH INTERESTS AND SUMMARY

- Transport mechanisms of sintered metal microfibrous porous solids
- Phase change heat transfer mechanisms in micro systems
- Heat pipe technologies including
 - Metal felt porous media as conformal wick structures
 - Micro-channel heat pipes
- MEMS cooling technologies and micro-fluidics

THESES DIRECTED

Rick Williams, Ph.D., August 5, 2002, "Porous Media Characterization of Microfibrous Metal Felts."

John Seifert, M.S., May 8, 2002, "Advanced Cooling Strategies for Radar Power Technologies."

Bhavin N. Vadgma, M.S., August 15, 2004 "Experimental Investigation of Heat Pipes with Micro-Fibrous Metal Felt Wick and R134a as The Working Fluid"

ARCHIVAL PUBLICATIONS

Harris, D. K., Warren, D. G. & Goldschmidt, V. W., 1997, "Impact of Manifold Design on Heat Exchanger Efficiency," *Journal of Heat Transfer*, 119 (2): pp. 357-362.

Harris, D. K. & Goldschmidt, V. W., 1999, "An Empirical Investigation into the External Heat Transfer of a U-Bend in Cross-Flow," *International Journal of Heat and Mass Transfer*, 42 (11): pp. 1957-1968.

Harris, D. K., Warren D, Raleigh, R. F. & Goldschmidt, V. W., 1999, "Empirically Derived Predictors of Natural Gas Flame Lengths in Circular Tubes," *International Journal of HVAC&R Research*, 5 (2): pp. 139-150.

Fang, L., Harris, D. K. & Goldschmidt, V. W., 2000, "Heat Transfer of a U-bend in a Cross Flow of Air at Different Angles of Incidence," *International Journal of Heat and Mass Transfer*, 43 (17): pp. 3053-3059.

Harris, D. K., Cahela, D. R., & Tatarchuk, B. T., 2001, "Wet Layup And Sintering Of Metal-Containing Microfibrous Composites For Chemical Processing Opportunities", *Composites Part A - Applied Science And Manufacturing*, 32 (8): pp. 1117-1126, Sp. Iss. SI 2001.

Harris, D. K. & Goldschmidt, V. W., 2002, "Measurements Of The Overall Heat Transfer From Combustion Gases Confined Within Elliptical Tube Heat Exchangers," *Experimental Thermal and Fluid Science*, 26 (1): pp. 33-37.

Zhang Yun, Renzhe Zhao Harris, D. K. & Johnson R. W., 2002, "A Computational Study On Solder Bump Geometry, Normal, Restoring, And Fillet Forces During Solder Reflow In The Presence Of Liquefied Underfill," *IEEE Transactions Electronics Packaging Manufacturing*, 25 (4): pp. 308-317.

Harris, D. K. & Simionescu, F., 2003, "Radiating Fin Analysis Using An Extended Perturbation Series Solution Technique," *AIAA Journal Of Spacecraft and Rockets*, 40 (1): pp. 141-142.

Williams, Richard, R. & Harris, D. K., 2003, "Cross-Plane And In-Plane Porous Properties Measurements Of Thin Metal Felts: Applications In Heat Pipes," *Experimental Thermal and Fluid Science*, 27, pp. 227-235.

Zhao Renzhe, Zhang Yun, Harris Daniel K., & Johnson R. Wayne, 2002, "Modeling of Flip Chip Assembly During Reflow in No-flow, Fluxing Underfill Process," *ASME Journal of Electronic Packaging*.

Williams, Richard, R. & Harris, D. K., 2003, "Wick Performance Characterization of Step-Graded Microfibrous Metal Felts," Under Review *International Journal of Heat and Mass Transfer*

CONFERENCES PROCEEDINGS

Harris, D. K., Warren, D. G. & Goldschmidt, V. W., "Impact of Manifold Design on Heat Exchanger Efficiency", 31st Intersociety Energy Conversion Engineering Conference, August 1996, Washington DC.

Goldschmidt+, V. W., Harris, D. K. & Skowron, E., "Reciprocating, Rotary or Scroll Compressors: Which and When?," First U.A.E. Conference on Air Conditioning in the Gulf, April 1996, Al Ain, U.A.E.

Harris, D. K., Warren D, Raleigh, R. F. & Goldschmidt, V. W., "Empirically Derived Predictors of Natural Gas Flame Lengths in Circular Tubes," AHSRAE Transactions of the Annual Winter Meeting, February 5-8, 2000, Dallas, TX.

Harris, D. K., "A Tutorial On The Recursive-Power-Series Approach To Solving Banded Matrices Encountered In Thermal And Fluid Systems," Proceedings of the SECTAM-XX, April 16-18, 2000, Callaway Gardens, Pine Mountain GA.

Harris, D. K., Cahela, D. & Tatarchuk, B. J., "Wet Layup and Sintering of Metal Containing Microfibrous Composites for Chemical Processing Opportunities", Processing of Fibers and Composites, United Engineering Foundation Conference, Castelvechio Pascoli, Italy, May 21-26, 2000.

Renzhe Zhao, Yun Zhang, R. Wayne Johnson, and Daniel K. Harris, "A Study of Normal, Restoring, and Fillet Forces and Solder Bump Geometry during Reflow in Concurrent Underfill/Reflow Flip Chip Assembly," 51st IEEE Electronic Components and Technology Conference, Lake Buena Vista, FL. May 29 - June 1 2001.

Richard R. Williams, Daniel K. Harris, and Jason C. Flenniken, "Characterization of Micro-fibrous Materials for use as Heat Pipe Wicks," Proceedings of the SECTAM-XXI, May 19-21, 2002, Orlando, FL.

Williams, Richard, R. & Harris, D. K., "Wick Performance Characterization of Step-Graded Microfibrous Metal Felts," *In Press*, *International Journal of Heat and Mass Transfer*.

RECENTLY SUBMITTED ARTICLES

Harris, D. K. "Pressure and Temperature Modeling And Validation of the Airbag Landing System for MER A&B Missions" Submitted to *AIAA Journal Of Spacecraft and Rockets*.

Williams Richard, R. & Harris D. K., "A Testing Methodology for Very Thin, Pliable and Non-Isotropic Porous Media," Submitted to *Journal of Experimental Methods*.

Vadgama, B. & Harris, D. K., "Wettability and Advancing Contact Angles of R134a on Copper and Aluminum Surfaces," Submitted to *International Journal of Heat and Mass Transfer*.