



2009 Mechanical Engineering Lecture Series



Critical Heat Flux Condition in Mini- and Microchannels

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Abstract:

With ever increasing power dissipation in electronic chips that are shrinking in size, cooling demands are becoming more severe. Forced air cooling is reaching its operational limits, and single-phase liquid cooling in microchannels has been able to accommodate the rising heat fluxes. Further increases in computing (chip) power suggest that a switch from single-phase to boiling heat transfer will be needed. A major impediment to using boiling or forced convective vaporization for such a cooling application is the limiting critical heat flux (CHF) condition. In this talk, the CHF condition in microchannels is reviewed. Data from the literature are discussed, and new data for a range of operating and geometric conditions are presented. Influencing factors, parametric trends, phenomenological models, and other aspects of the CHF condition are discussed.

Biography:

Michael Jensen received his B.S. in Mechanical Engineering from the University of Missouri-Columbia in 1972 and his M.S. and Ph.D. degrees from Iowa State University in 1976 and 1980, respectively. He began his teaching and research career at the University of Wisconsin-Milwaukee and moved to Rensselaer in 1987. Currently, he is a Professor in the Department of Mechanical, Aerospace, and Nuclear Engineering. As principal investigator on 40 sponsored programs, including 18 multi-year grants from NSF, DOE, NIST, NYSERDA, and industry, Michael's research interests have been directed toward convective single- and two-phase heat transfer and the associated fluid flows with an emphasis on these processes in heat exchangers and using enhanced heat transfer techniques. Recent research has focused on microchannel flows and thermal management of electronic systems, solar energy, and fuel cells.

Jensen is active in his profession, having served or is serving on editorial boards of four international journals (*Journal of Heat Transfer*, *Experimental Thermal and Fluid Science*, *Applied Thermal Engineering*, *Journal of Mechanical Science and Technology*), was recently named Founding Editor-in-Chief of ASME's newest journal, *Thermal Science and Engineering Applications*, and has led the ASME Heat Transfer Division, and appointed as Alternate Delegate to the Assembly for International Heat Transfer Conferences.

Date: Friday, May 8 at 2:00 pm

Place: 1202 EGR (Glenn L. Martin Hall)

Host: Dr. Jensen will be hosted by Professor Jungho Kim of Mechanical Engineering