SEMINAR SERIES

International Institute for Carbon-Neutral Energy Research
Kyushu University

Title **Flow Boiling Heat Transfer Mechanisms Using IR Thermography**

Speaker Prof. Jungho KIM
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Date & Time Friday, May 18, 2012 4:00p.m.

Place INAMORI Hall, Ito campus, Kyushu University

Abstract

A novel technique to measure heat transfer and liquid film thickness distributions over relatively large areas for two-phase flow and heat transfer phenomena using infrared (IR) thermometry is described. IR thermometry is an established technology that can be used to measure temperatures when optical access to the surface is available in the wavelengths of interest. In this work, a midwave IR camera is used to determine the temperature distribution within a multilayer consisting of a silicon substrate coated with a thin insulator. Since silicon is largely transparent to IR radiation, the temperature of the inner and outer walls of the multilayer can be measured by coating selected areas with a thin, IR opaque film. If the fluid used is also partially transparent to IR, the flow can be visualized and the liquid film thickness can be measured. The theoretical basis for the technique is given along with a description of the test apparatus and data reduction procedure. The technique is demonstrated by determining the heat transfer coefficient distributions produced by droplet evaporation and flow boiling heat transfer.

About the Speaker

Jungho Kim is a Professor in the Department of Mechanical Engineering where he performs research and teaches courses in a broad range of thermal sciences areas. He developed the microheater array technique under NASA sponsorship to measure time and space resolved heat transfer rates during boiling, spray cooling, and within microchannels. NASA used the microheater arrays as the basis of an International Space Station experiment (MABE) that was used to study microgravity pool boiling in 2011. He is currently developing another technique to measure the heat transfer distribution within complex geometries using IR thermography. Other research includes the measurement of absorbance coefficient of reactants at high temperatures, and the development of fast response heat flux gages. He has received funding in the past from NASA, NSA, NIST, Parker Hannefin, ONR, NSF, Northrup Grumman, WPAFB, ATEC, and Weatherbug. He is active in ASME, having served as Chair of the K-13 committee on Multiphase Heat Transfer. He has won numerous awards for teaching and instrumentation design, and is the holder of two patents.

Host: Professor Yasuyuki TAKATA

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