Journal of Heat Transfer

1999 JHT Heat Transfer Gallery

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The ASME Heat Transfer Visualization Committee organized two photo gallery sessions in 1998. The *International Heat Transfer Photo Gallery* was held at the l la' International Heat Transfer Conference (IHTC) in Kyongju, Korea, and the *Visualization of Thermal Phenomena* was held at the International Mechanical Engineering Congress and Exposition (nvIECE) in Anaheim, California. Twelve visualization entries were displayed in the *Visualization* of *Thermal Phenomena* at the 1998 ASME-RVVIECE and the *International Heat TransferPhoto Gallery* at the 1998 IHTC drew the attention of international participants with fifteen displays.

In the following ASME Journal of Heat Transfer Gallery, a total of fifteen photos selected from the *International Heat Transfer Photo Gallery* and *Visualization of Thermal Phenomena* are shown. The photographs illustrate and draw attention to the aesthetic qualities of thermal phenomena that occur in the presence of temperature gradients. The photographs include phenomena of forced convection, melting, boiling, combustion, etc. They are evaluated and selected by a distinguished panel of engineers based upon originality, the ability to convey and exchange information to understand a thermal process, and the artistic beauty of heat transfer. I hope that you enjoy browsing through this collection of photographs.

The Journal of Heat Transfer Gallery would not have been possible without the support of the Senior Editor, Dr. Jack Howell, the previous chair of the Visualization Committee, Dr. C. T. Avedisian, and the members of the Executive Committee of the ASNIE Heat Transfer Division. Also, Dr. C. N. Ammerman, Ms. D. Mullins, and Mr. K. N. Rainey were instrumental in organizing and supporting the Heat Transfer Gallery activities. Finally, thanks are due to the wonderful photo gallery participants and reviewers who contributed to make it happen.

The Committee is off to a good start in 1999 and is looking ahead to new and exciting activities including the stand-up video session at the 1999 ASME National Heat Transfer Conference. The tradition of the Heat Transfer Gallery will be continued next year by offering a gallery session at the upcoming HVVIECE meeting to be held in Nashville in November 1999.

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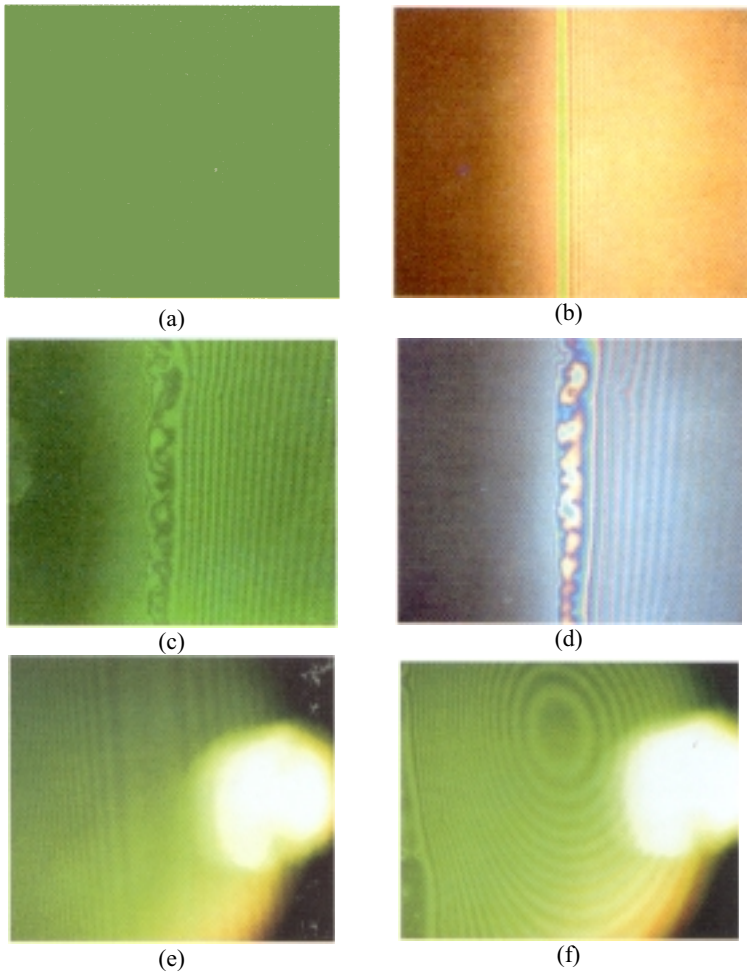

THICKNESS AND SLOPE MEASUREMENTS OF EVAPORATIVE THIN LIQUID FILM

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The Fizeau interfaometric fringes, constructed by the two reflected rays respectively from the solid-liquid and liquid-vapor interfaces, allow measurement of the evaporative thin film thickness at an accuracy of $\lambda/4n$ for liquid of refractive index n when a monochromatic light source of A is used (Karthikeyan et al., 1998). When a white light source is used, rainbow-like interferomehic fringes are formed and their color spectrum is constructed in different orders depending on the slope of film thickness: R-Y-G-B for thinning film and R-B-G-Y for thickening film.

Pentane (n = 1.357) film on a clean glass surface under constant heat flux is visualized for monochromatic (λ = 520 nm) fringes in (a), where the film thickness changes by 0.096 μm per fringe. The order of rainbow fringes in (b) shows that the widest central region is the thinnest and the film thickness increases in both directions. The field of view of all recorded images has approximately 700 μm x 600 μm in dimension. The deformed fringes formed around the impurity particles shown in (c & d) readily identify impurity in the liquid film. The dramatic fringe movement around the high-voltage electrode (imaged as the blurred white spot in (e) at 0 V & (f) at 3.0 kV) clearly demonstrates the idea of nonintrusive control of thin film using the electrohydrodynamic (EHD) phoresis.