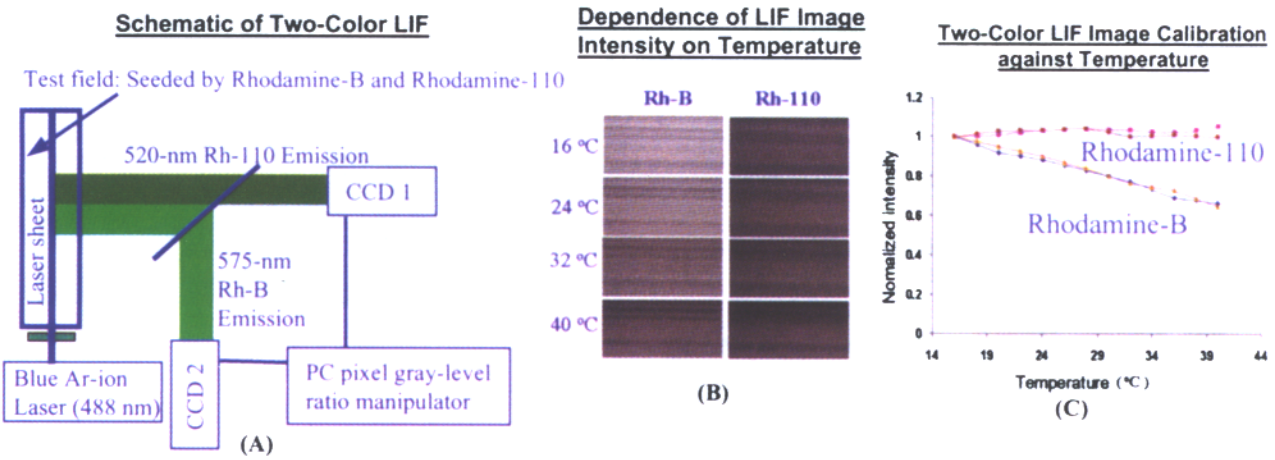

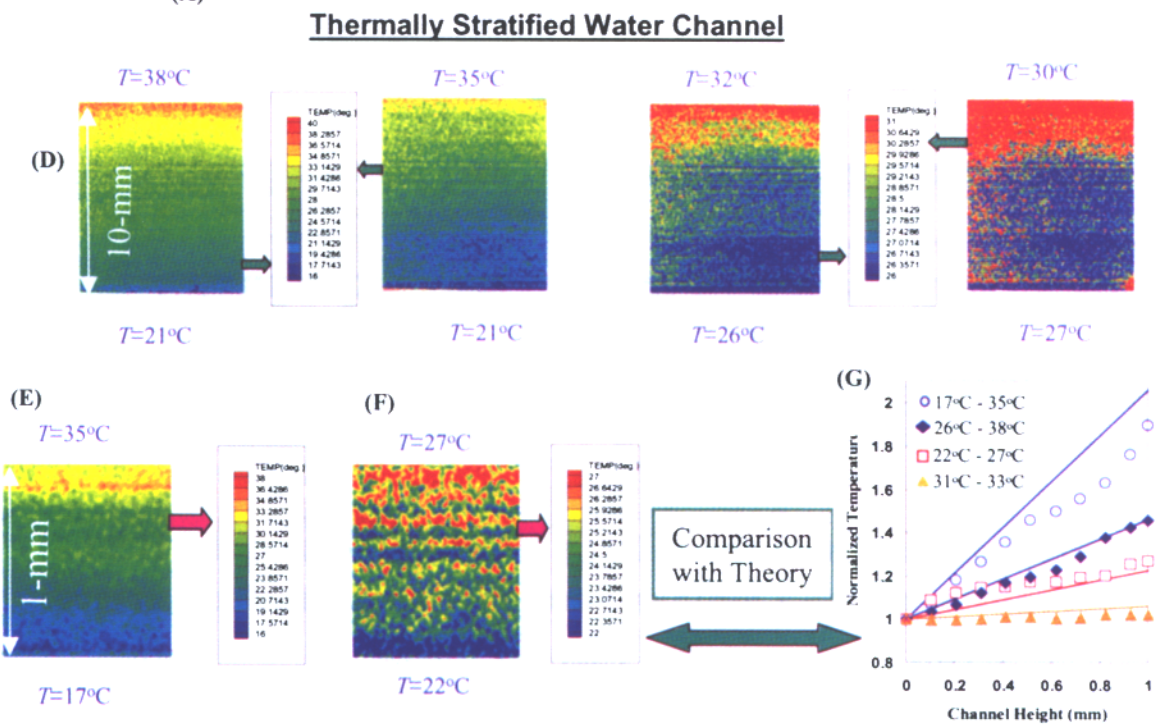

TWO-COLOR (Rh-B & Rh-110) LASER INDUCED FLUORESCENCE (LIF) THERMOMETRY WITH SUB-MILLIMETER MEASUREMENT RESOLUTION

H. J. Kim and K. D. Kihm
Texas A&M University, College Station, Texas

Two-color laser induced fluorescence (LIF) technique (**Inset A**) uses two fluorescence dyes with different emission characteristics – one is the temperature sensitive dye (Rhodamine-B) and the other is the temperature insensitive dye (Rhodamine-110). The ratio of the two fluorescence emission intensities, therefore, provides a calibrated correlation with temperature that does not depend on the laser illumination intensity variation and is free from the possible bias occurring from background noise (**Insets B & C**). The developed technique measures thermally stratified water layers with known linear temperature distributions. The **Inset D** shows "false-color" images of the intensity ratios measured for 10-mm cuvette, and the **Insets E** and **F**, for 1-mm cuvette. The temperature data, converted from these images (**E, F**) using the calibration (**C**), shows fairly accurate comparison with the theory (**Inset G**). The minimal spatial resolution is estimated to 10 μm and the maximum data uncertainty for a spatial resolution of 300μm by 200μm is estimated to be ±1.45 °C with a 95% confidence interval.