Local Two-Phase Heat Transfer from Confined and Submerged Impinging Jets

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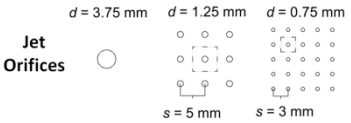
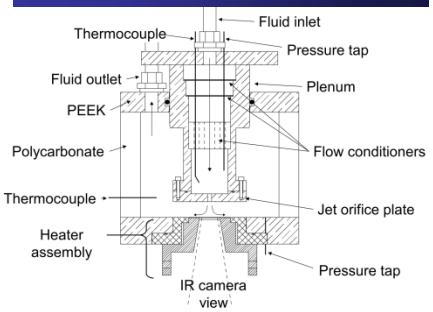
Objective

Characterize the spatially non-uniform cooling of two-phase impinging jets and jet arrays as a function of applied heat flux

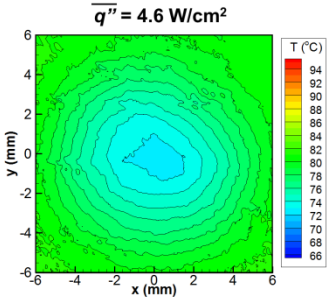


Approach

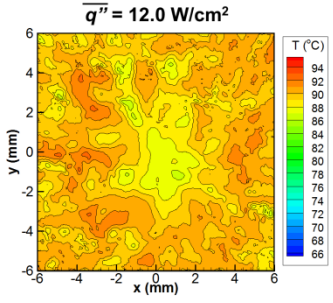


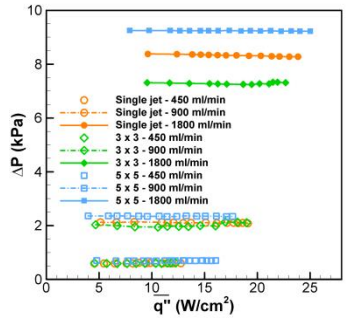
- Experimentally map local temperatures in single- and two-phase operation
- Compare pressure drop and local and average heat transfer coefficients of three orifice designs

Single-Phase



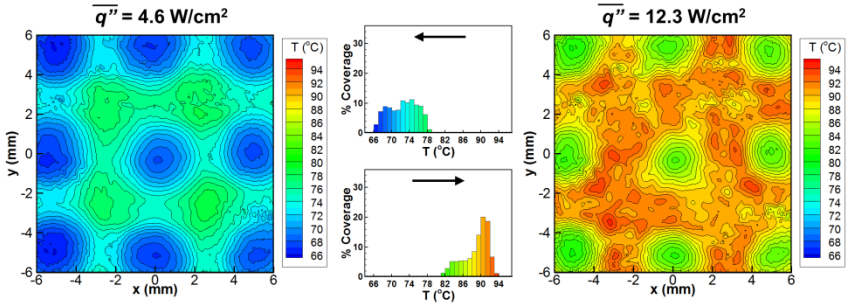
Two-Phase

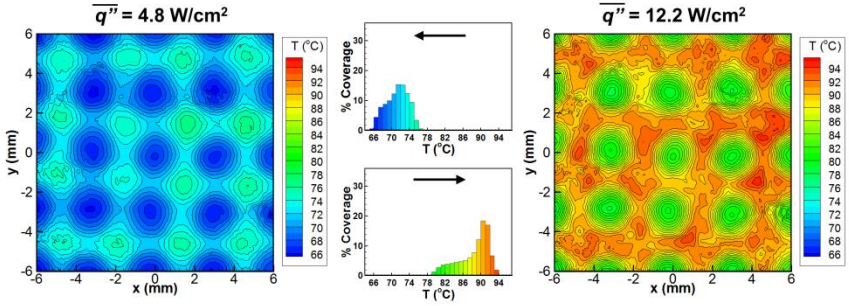




Pressure drop remains constant regardless of applied heat flux

Spatial temperature maps in single-phase (left) and two-phase (right) operation illustrate that the large single jet results in the highest degree of temperature uniformity





Impact

- Improve orifice design tools for two-phase jet impingement cooling systems
- Highlights the trade-off between temperature uniformity and overall heat dissipation in two-phase jet orifice design

Selected Publications

Rau, M.J., Garimella, S.V., 2013, "Local two-phase heat transfer from arrays of confined and submerged impinging jets," Int. J. Heat and Mass Transfer 67, 487-498.

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