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Multiscale Enhancement Techniques in Pool Boiling

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Abstract

Pool boiling is employed in many applications including power generation, food processing, nuclear reactor core cooling and high heat flux dissipation in CPU cooling. Performance enhancements are needed in these applications - either to extend the critical heat flux (CHF) limit in nuclear reactors for example to increasing heat transfer coefficients (HTC) in refrigeration and air conditioning applications. The talk will present different heat transfer mechanisms employed at mini-scale, microscale and nanoscale with tremendous improvements in CHF as well as HTC. It will also highlight some potential avenues where combining them with multiscale enhancement techniques can lead to even higher levels of performance. The key to boiling enhancement is knowing how the bubbles behave and using that knowledge to come up with techniques that control the bubble growth and bubble motion for unprecedented gains in boiling performance.