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Deep Learning Strategies for Critical Heat Flux Detection in Boiling YING SUN, MOEIN RASSOULINEJAD-MOUSAVI, TEJASWI SOORI, Drexel Univ, FIRAS AL-HINDAWI, HYUNSOO YOON, TERESA WU, Arizona State Univ, HAN HU, University of Arkansas — In this talk, we present image-based deep learning models that enable detection of critical heat flux (CHF) using pool boiling experimental images. Classifiers that identify pool boiling regimes are trained using conventional Convolutional Neural Network (CNN) and Transfer Learning (TL). Results show both models accurately identify the boiling regimes using the same dataset for training and validation. To assess the generalization of each model, a cross-dataset experiment is conducted. It is found that the TL model can detect the CHF with 93.6% accuracy compared to 58.8% for conventional CNN on a second double-blind test set. In addition, in comparison to the CNN model, only 10% image frames fed for CNN training are used for training the TL model, demonstrating the potential of TL for handling data scarcity commonly encountered in engineering applications.

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