# Consideration of radial mass transfer based on turbulent interchange in the liquid sublayer dryout model

[1]Hong Chae Kim, [2]Won Pil Baek and [1]Soon Heung Chang

[1]Korea Advanced Institute of Science and Technology
373-1 Kusung, Yusung, Taejon, Korea 305-701

[2]Korea Atomic Energy Research Institute
150 Dukjin-dong, Yusong-gu, Taejon 305-353, Korea

## ABSTRACT

A unified critical heat flux prediction model for flow boiling in uniformly heated tubes was suggested based on liquid film dryout by Kim et al. (2000). The model successively calculated CHF for bubbly and annular flow with implication of flow regime transition criteria using a single governing equation for the liquid film on a heated wall with regard to the mass transfer at the film interface. In the bubbly flow, the radial mass transfer between the liquid sublayer and the bubbly layer was neglected based on the assumption that the inlet flow to the liquid sublayer is very small compared to the evaporation term. However, there was relative comparison between the radial mass transfer term and evaporation term. In this study, the radial mass transfer is considered based on turbulent interchange. For the liquid sublayer and bubbly layer, different mixing lengths are used to compute turbulent velocity. The calculated radial mass transfer term is compared with the evaporation term along the uniformly heated length. According to the investigation, net radial inlet flow to the liquid sublayer still exists near the CHF position and becomes smaller as heat flux increases compared to the evaporation. For some reference CHF data, the liquid sublayer model with the radial mass transfer was assessed. Because of the net inlet flow to the liquid sublayer, calculated CHF values are higher than those computed without considering the radial term.