

Article Abstract

Title:	An analytical study of critical heat flux in natural convective boiling in a vertical tube
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Abstract:	An analytical study is performed for the prediction of Critical Heat Flux (CHF) during natural convective boiling in a vertical uniformly heated tube, submerged in a saturated liquid bath, by a model where vapor forms a paraboloid under co-current flow situation. Mass, momentum and energy balances for the two-phase flow in the vertical tube are used to construct the model together with the criterion that the CHF is considered to be taking place at the exit of the heated tube when mass flux is maximum. About 300 CHF data are predicted for saturated Water, R113 and R12 at different pressures of $P = 0.1$ to 3.0 MPa for different tube geometries (diameter, $D = 1.12$ to 18.4 mm, and heating length, $L_{he} = 23$ to 960 mm). The characteristics of CHF predicted by this model are explained and compared with similar existing experimental works. The effects of working fluids, working pressure, and tube geometry are mainly explained and compared to verify the basic performance of the model.
Keywords:	Critical heat flux, natural convection, vertical tube, Analytical method, Prediction.