

Two-Phase Flow in the Natural Circulation of a Pressurized Water Reactor

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Abstract - In this paper, natural circulation phenomena in a pressurized water reactor during a small break loss of coolant accident is investigated analytically. By using a one-dimensional analyses and quasi-steady state for two-phase flow, the values of the mass flow rate versus the primary coolant pressure for different core power are determined. It is found that the mass flow rate is reduced suddenly when the two-phase natural circulation is started. Also, it is found that the effect of the core power on mass flow rate is insignificant in the two-phase natural circulation. The analytical results of this paper are compared with previous experimental results and show a very good agreement.

Keywords: Natural circulation; PWR; Two-phase; LOCA