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Direct-Contact Condensation Regime Map for Core Makeup Tank of Passive Reactors

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Abstract

The condensation regime map in the core makeup tank of passive reactors is experimentally investigated. The condensation regimes identified through the experiments are divided into three distinct ones: sonic jet, subsonic jet, and steam cavity. The steam cavity regime is a unique regime of downward injection with the present geometry not previously observed in other experiments. The condensation regime map is constructed using Froude number and Jacob number. It turns out that the buoyancy force has a large influence on the regime transition because the regime map using the Froude number better fits data with different geometries than other dimensionless parameters. Simple correlations for the regime boundaries are proposed using the Froude number and the Jacob number.