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Heat Transfer Deterioration Mechanism for SMR operating at Supercritical Pressure

Heat transfer deterioration (HTD) phenomena in SMR operating at supercritical pressure (Gen-IV Reactor Design) pose a significant thermal hydraulic challenge. Extensive research has been conducted on the onset of HTD and the bouncy effect it induces. However, little attention has been given to understanding the mechanism behind HTD occurrence. This study aims to analyze the velocity and temperature boundary layers in three dimensions during heat transfer deterioration conditions. The impact of changes in thermophysical water properties within the fluid boundary layer on the heat transfer coefficient is examined. The study also observes and document the analogy between HTD and the critical heat flux condition observed in subcritical boiling. In HTD conditions, it is predicted that the flow inside the tube may clot or suddenly stop due to the substantial variation in density and other thermophysical properties along the radial direction of the tubes.

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Confirm that the work is original and has not been published anywhere else

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