STUDY ON THE VISUAL OBSERVATION OF MOLTEN MATERIAL AND A COOLANT

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In a core disruptive accident (CDA) of a Fast Breeder Reactor (FBR), the post accident heat removal (PAHR) is crucial for the accident mitigation. The molten core material should be solidified in the lower plenum of the reactor vessel. It is pointed out that the molten material can be cooled in sodium coolant if the molten material is fragmented and solidified during molten material and coolant interaction. However, it is still unknown how the molten material jet is solidified and fragmented in a coolant.

The purpose of present study is to experimentally clarify the molten material jet fragmentation behavior by using water and the simulating molten material that is ejected as jet. The distributed and fragmented behavior of the jet is visually observed with the high-speed video camera especially focusing on the surface wave instability and breakup behavior on the jet. The experimental results are compared with the existing theories.

Consequently, it is clarified that the marginal wavelength on the surface of the water jet is close to the value by the Reyleigh-Taylor instability, and the diameter of the fragmented molten material jet is close to the value by the Kelvin-Helmholtz instability.