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Model validation of the ASTERIA-FBR code related to core expansion phase based on THINA experimental results

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Mechanical consequences which might be caused by core disruptive accidents (CDAs) are one of the major concerns in FBR safety. Once a severe re-criticality occurs, core materials are vaporized creating a CDA bubble which consists of fuel vapor, steel vapor and fission gases. Rapid expansion of the CDA bubble drives a sodium slug of the upper plenum and threatens integrity of the shielding plug. Energy conversion from thermal energy to mechanical energy plays an important role for the boundary integrity during core expansion phase.

This paper describes model validation study of ASTERIA-FBR related to the thermal-to-mechanical energy conversion process, focusing on calculation models such as interfacial area model through the THINA* test simulation. As a result, it was found that the energy conversion process and its ratio were in good agreements with the experimental results. Mechanism of CDA bubble expansion and uncertainty brought by calculation models were also discussed.

[References]

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