

## Coolant flow monitoring with an Eddy Current Flow Meter at a mock-up of a liquid metal cooled fast reactor

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As a possible part of the safety instrumentation in liquid metal cooled fast reactors, the Eddy Current Flow Meter (ECFM) is an important and robust tool for continuously monitoring the coolant flow and detecting coolant blockages in the reactor subassemblies for coolant temperatures of up to 700 °C. This inductive sensor can be placed directly above the subassemblies, where changes of the coolant flow angle between 0° and 40° are expected in case of a coolant blockage at some subassembly. In this paper, we present the results of numerical simulations as well as experimental results for the influence of the flow angle with respect to the axis of the ECFM on the output signal of the sensor. In a second experimental setup, an array of ECFM is used to detect and localise coolant blockages by artificially blocking one or more flow channels. For both experiments, a simplified liquid metal flow model was constructed, using the eutectic alloy of Gallium, Indium and Tin to represent flow structures which may typically occur above the subassemblies. Due to the low melting point of this alloy, we were able to perform these experiments at room temperature and to validate the ECFM measurements by ultrasonic velocity measurements available at such lower temperatures. The results of our investigations give important insights into the performance of the ECFM under realistic conditions inside the reactor.

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