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V&V STATUS OF CFD CODES APPLIED TO BN REACTORS

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Using CFD codes for numerical simulation of thermohydraulic processes occurring in fast sodium reactors, specific character of heat transfer in liquid metals and complicity of computational model development should be taken into account due to integral layout of reactor equipment.

Application of universal non-Russian CFD codes (CFX, Star-CD, Fluent, etc.) does not enable to take into account specific character of sodium coolant because Reynolds analogy is taken as basis for parameter determination.

To solve the problem, the Russian code FlowVision implements an original model of turbulent heat transfer. Such problem is set during implementation of Project "New generation codes" within which LOGOS code is developed.

One more way to solve the problem is to apply thermohydraulic codes of DNS category, and particularly CONV-3D code.

To verify CFD codes with regard to BN reactors, the verification matrix is developed which includes:

- analytical tests;
- benchmarks of the basis of experimental studies;
- task on the basis of data obtained during BN-600 operation;
- tasks with regard to newly performed experimental studies.

To obtain missing data, sodium facility is designed, constructed, and commissioned at RAS UB ICMM (Perm). The following has been experimentally studied:

- convective current of sodium in pipes with various aspect relations and grade angles;
- mixing of sodium flows of different temperatures using various models.

The paper contains results of experimental studies and performed verification for codes FlowVision, CONV-3D, and LOGOS with regard to BN reactors.

Country/Int. Organization

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