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# Applications of the DNS CONV-3D Code for Simulations of Liquid Metal Flows

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For the simulation of the thermalhydraulic processes in fast reactors with liquid metal coolant DNS CFD code CONV-3D has been developed.
This code has ideal scalability and is very effective for calculations on high performance cluster computers.
The code has been validated on the set of analytical tests and experiments in a wide range of Rayleigh and Reynolds numbers, in particular, at extremely small Prandtl numbers. The paper presents the results of the application of CONV-3D code for simulation of sodium natural convection in the upper plenum of the MONJU (Japan) and BN-600 (Russia) reactor vessel. A satisfactory agreement of the numerical predictions with experiments is demonstrated. The calculation results of the experiment conducted on the Phenix facility (France) with sodium coolant are demonstrated. The experiment focuses on the mixing of two fluxes at different temperatures in the secondary circuit of reactor facility with liquid metal coolant in the presence of a bending tube. A small pipe is connected via T-connection to the main pipe and unloads of sodium in the main pipe at a temperature which is higher than in the main pipe. A satisfactory agreement of the numerical predictions with experiments and commercial codes is demonstrated, in particular for the temperature distribution vs the coordinates.
The results of simulation of heavy-liquid metal (LBE) flow and heat transfer along a hexagonal 19-rod bundle with wire spacers (KALLA, Germany) are presented. A convergence on a sequence of grids and convergence with the experiment is demonstrated.
The results obtained allow to conclude that using of CONV-3D code with high predictive power can be recommended for reactor applications.

## Country/Int. Organization

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