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Application of CFD simulation to validate the BREST-OD-300 primary circuit design

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Information has been obtained on the flow distribution along parallel paths, on the situation of the free levels, on the heat and mass transfer processes. Experimental determination of the hydraulic parameters is only possible for the components of the core by using full-scale mock-ups. The remaining elements of the circulation loop require calculation justification supported by experiments on fragmentary models. The three-dimensional flow in the first loop of the reactor requires using of computational fluid dynamics methods (CFD). The computational model includes the porous domains (the core and the steam generator modules) and the area for which the RANS simulation is performed. The hydraulic parameters of the porous domains are defined on the basis of experiments (for the components of the core) and the prior CFD calculations (for the SG modules). When creating the computational model the experience of the CFD code verification from the point of view of the modeling of the liquid metal coolants flow was taken into account. The main design parameters of the reactor circulation loop are confirmed. The information on the spatial distribution of the thermal parameters of the coolant is useful for clarifying of the stress-strain state of the structural elements, and in the formulation of the requirements for the placement of the reactor control system sensors.

Country/Int. Organization

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