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## Experimental investigations of velocity and temperature fields, stratification phenomena in a integral water model of fast reactor in the steady state forced circulation

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The results of experimental investigations of local velocities for height and radius of the top of the camera in the plane in the direction from the core center to the intermediate heat exchanger and the temperature of the coolant in the upper (hot) chamber, and other elements of the circulation circuit on the integrated water model of the reactor on fast neutrons (scale ~ 1:10) for the stationary forced circulation mode, simulating a nominal operation regime. The data obtained on stand V-200 using a specially designed and implemented system of measurement that provides high measurement accuracy and speed of registration. The results show that the structure of nonisothermal motion of the coolant in the top chamber model is defined by the action of lifting forces: hot coolant from the core rises up through the Central column to the surface section and forms a vast vortex nearly isothermal zone in the upper region of the chamber from which flows into the intermediate heat exchangers. Above the side screens formed of insulated cold zone of the heat carrier, the size of which increase with the overall consumption increase. On stratified horizontal boundary insulated zones across the cross-section model of the reactor tank there are internal waves which cause temperature pulsations in the material of the walls of the equipment. There is a significant and stable thermal stratification of the coolant not only in the peripheral area of the top chamber of the reactor above the side screens, but in the cold and the pressure chambers, elevating the enclosure, the cooling system of the reactor, at the outlet of the intermediate heat exchangers. At the boundaries of stratified and recycling entities recorded strong gradients and temperature pulsations, allowing to judge about the amplitude and frequency characteristics of temperature pulsations in these potentially hazardous areas. The data obtained indicate the necessity of taking into consideration the stratification phenomena in justifying reliability management, security, design terms of operation of fast reactors.

### Country/Int. Organization

SSC RF –IPPE, MPEI, IVT RAN

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