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Models of the integral EUCLID/V2 code for numerical simulation of severe accidents in a sodium-cooled fast reactor with MOX and MNUP fuels

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For the modeling of severe accidents in a sodium-cooled fast reactor coupled multiphysics EUCLID/V2 code is being developed in Russian Federation in Codes of New Generation subproject of "Proryv"project. Multiphysics code allow calculating all relevant processes occurring during severe accident: reactor power change including due to boiling and melting, coolant boiling and dryout, cladding and fuel melting (for MOX fuel), as well as fuel dissociation (for MNUP fuel), movement and solidification of the resulting melt, the formation of a pool of melt, the release and transport of fission products in the reactor and beyond and others.
To simulate thermohydraulic processes HYDRA-IBRAE/LM module is used in the EUCLID/V2 code. This module simulates processes in one- and two-phase coolant flow. For fuel rod behavior modeling the BERKUT module is used. The processes of core damage are represented by the severe accident module SAFR. Also EUCLID/V2 code contains the DN3D neutronics module and the AEROSOL-LM module for calculation of the FP transport in the reactor facility and in the containment compartments. MCU-FR module based on Monte-Carlo method is used to estimate the secondary criticality of the core configuration during severe accident.
In the contribution the brief description of each module is given as well as the algorithms used to make the computational grids of all modules to be consistent and for modules coupling. Some results of the EUCLID/V2 V&V calculations are also presented.

Country/Int. organization

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