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SOCRAT-BN integral code for safety analysis of NPP with sodium cooled fast reactors: development and plant applications

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The SOCRAT-BN integral code has been developed in frame of Federal Target Program «New-Generation Nuclear Power Technologies for the Period 2010–2015 and up to 2020». The code is intended for safety justification of NPPs with sodium-cooled reactors under DBA and BDBA including those that lead to core melting. The modules integrated into SOCRAT-BN code allow to perform coupled simulation of thermal-hydraulics, neutron physics, thermal-mechanics state of fuel and cladding, melting and displacement of core materials, accumulation and transport of fission products in the coolant loops and environment. The report represents description of the basic code modules and its V&V results on the base of out-of-pile and in-pile experiments. The SOCRAT-BN code is used for the safety justification of NPP with sodium cooled reactors. In particular, the calculations of the following hypothetical accidents have been performed: unprotected loss of flow through the core (ULOF), unprotected positive reactivity insertion (UTOP) and total inlet flow area blockage of single subassembly (TIB). The report presents the analysis of the simulation results.

Country/Int. Organization

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