

Towards RIA simulations of ATF fuel in large and small modular water cooled reactors by means of TRANSURANUS

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In the frame of various Euratom and other international projects, (enhanced) accident tolerant fuel properties (ATF) have been implemented in the TRANSURANUS fuel rod performance code of the JRC. The impact of ATF has been addressed in different studies by means of the TRANSURANUS code. In the first study the focused was on steady-state performance in a case of the coordinated research project FUMEX-II organized by the IAEA. In a second study, this was extended by means of a design accident base study in a small modular reactor of the Nuscale-type in the frame of the McSAFER project utilizing fresh fuel. We used the Serpent2 code for Monte Carlo neutronics, SUBCHANFLOW code for thermal hydraulics, and the TRANSURANUS code to model the thermal mechanics of all the individual fuel rods. We successfully simulated two rod ejection scenarios and analysed the effect of some ATF. These results are briefly outlined here and complemented with a more detailed stand-alone TRANSURANUS simulation of a commercial irradiated fuel rod submitted to a RIA from the FUMEX-III coordinated research project of the IAEA. The RIA analysis of this FK1 rod was carried out both with the standard materials as well as the same ATF from the RIA simulations in the McSAFER paper.

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