Advanced technology fuels material property models implementation in the TRANSURANUS platform

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In line with the fuel rod design change methodology developed for VVER-440 in the frame of the former ESSANUF project, existing computer codes for nuclear fuel cycle safety justification need to be updated to take into account the specific features of the new fuel, such as thermomechanical properties of fuel, cladding, gas gap, etc. In the frame of the more recent R2CA and McSAFER projects, for instance, some property models for advanced technology fuel material have been implemented in the TRANSURANUS code. In a similar manner, in the current APIS project the corresponding property models for the Cr-doped UO₂ and Cr-coated Zircaloy-4 advanced fuel materials have been implemented in the TRANSURANUS code, along with ADOPT fuel property models from Westinghouse. The implementation work is outlined here, along with the application during a loss of coolant accident based on the Halden IFA 650.10 case. The paper ends with an overview of future developments, such as the optimisation of some material property models based on an advanced methodology for model calibration being developed in the framework of the APIS project.

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