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Aushang

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Unser Zeichen: ISC
Datum: 27. November 2024

Einladung zum Seminar über „Nukleare Energieerzeugung“

Hybridveranstaltung

Zeit: **Montag, 2. Dezember 2024, 11:00 Uhr**

Ort: Karlsruher Institut für Technologie, Hermann-von-Helmholtz-Platz 1
76344 Eggenstein-Leopoldshafen, INR, Bau 522, Raum 216

VC: online **Jetzt an der Besprechung teilnehmen**

Referent: **Herr Nuri Beydogan**, Karlsruher Institut für Technologie, INR

Titel: Advanced Analysis of Reactor Cores with Hexagonal Fuel Assemblies using High-fidelity Multi-physics Codes

Abstract:

Modern reactor core loadings include increased axial and radial heterogeneities at fuel assembly and pin levels. These heterogeneities cause large gradients of the neutron current for adjacent fuel assemblies and fuel pins. The diffusion equation approximations are no longer valid for these conditions. In addition, depletion analysis in full-core is generally performed without thermal-hydraulics feedback or by considering 1D system thermal-hydraulics code feedback. Accurate analysis of nuclear reactors is required to design and predict safety margins. Multi-physics analysis based on Monte Carlo-based neutron transport and subchannel thermal-hydraulics analysis codes are able to predict local safety parameters limits, e.g., DNBR, fuel and cladding temperatures.

The detailed pin and subchannel level (SERPENT2/SCF) and nodal-level (PARCS/SCF) full-core coupled neutronic and thermal-hydraulics burnup simulations were performed for a boron dilution and stepwise control rod insertion test in Rostov-2 VVER-1000 core (OECD/NEA Rostov-2 VVER-1000

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Benchmark). The high-fidelity and nodal-level burnup simulations were performed from 0 EFPD (fresh fuel) to 36.37 EFPD (1.45 MWd/kgU) considering the change of power level, control rod position, boric acid concentration, and core thermal-hydraulics parameters.

The validations of the depletion capabilities of the SERPENT2/SCF and PARCS/SCCF were performed by using core test data at 36.37 EFPD (1.45 MWd/kgU) and 69.92% of the nominal power level. Estimations of PARCS/SCF simulation are sufficient for the prediction of the global parameters. Meanwhile, SERPENT2/SCF results show that local-level predictions of high-fidelity simulation are in better agreement with core test data.