

LSM/LRT-Seminar

Tuesday, March 5th, 2019, 10:00-11:00 OSGA/EG06

Extension of the nodal code DYN3D to SFR applications

Public PhD thesis defense
Evgeny Nikitin (HZDE/EPFL)

Chaired by thesis director: Prof. Andreas Pautz (PSI/EPFL)

DYN3D is a well-established Light Water Reactor simulation tool and is being extended for safety analyses of Sodium cooled Fast Reactors (SFRs) at the HZDR. This thesis focused on the first stage of the development process, that is, the extension and application of DYN3D for steady-state and transient SFR calculations on reactor core level. In this presentation, I will speak about the main developments of my PhD study summarized as follows:

- Establishment of a homogenized cross section generation methodology for nodal diffusion calculation of realistic SFR cores based on the use of the Monte Carlo code Serpent.
- Development of thermal expansion models for DYN3D, which are capable of treating two important thermal expansion effects occurring within the core, namely axial expansion of fuel rods and radial expansion of diagrid.
- Verification and validation of the extended DYN3D against selected IAEA benchmark tests on the Phenix end-of-life experiments that contain both steady-state and transient calculations.