



Karlsruher Institut für Technologie

KIT | INR | Hermann-von-Helmholtzplatz 1
76344 Eggenstein-Leopoldshafen

Aushang

Institut für Neutronenphysik und Reaktortechnik

Komm. Institutsleitung:
Prof. Dr.-Ing. John Jelonnek

Hermann-von-Helmholtz-Platz 1
76344 Eggenstein-Leopoldshafen

Telefon: 0721-608-22552
Fax: 0721-608-23718
E-Mail: ingeborg.schwartz@kit.edu
Web: www.inr.kit.edu

Bearbeiter/in: Ingeborg Schwartz
Unser Zeichen: ISC
Datum: 23.06.2026



Einladung zum Seminar über „Nukleare Energieerzeugung“

Zeit: Montag, 13. Juli 2026, 11:00 Uhr

Ort: Karlsruher Institut für Technologie, Hermann-von-Helmholtz-Platz 1
76344 Eggenstein-Leopoldshafen, INR, Bau 521, Raum 302

Referent: Herr Dr. Michael Böttcher, Karlsruher Institut für Technologie, INR

Titel: CFD simulation of PWR primary loop systems and test facilities

Abstract:

Since more than 10 years at KIT-INR several CFD models for nuclear power reactors – mainly for pressurized water systems- were developed, that take all components of the pressure vessel and the primary loops into account.

The simulation of NPP including vessel and primary loop components provides challenging requirements for CFD tools because of the geometrical complexity of the facilities and the necessity of compromises between detail accuracy, porous media modelling and physical model limitations in order to obtain handable computational costs.

CFD models for SMR's (Small Modular Reactor) as well as larger power plants like VVER-1000 and Three Mile Island were developed using commercial CFD and meshing tools.

In this presentation, CFD models of the Motel (Modular Test Loop) facility used for testing of SMR components and for the Three Mile Island nuclear power plant in Pennsylvania – USA – known for a severe accident with partial core meltdown - are presented. The undamaged unit 1 is intended to put into operation again because of electricity consumption by KI computational centers.

While the Motel facility allows a full detailed spatial resolution by CFD, the TMI model contains several porous media regions. The first focus for the TMI model is the analysis at nominal operation conditions and forced convection flow, while for the Motel facility – operated at buoyancy driven flow- an experiment with asymmetric core heating is chosen, which requires a high detailed simulation of the entire system.

In both models the handling of SG (Steam Generator) heat transfer from single phase primary loop flow into a multiphase flow on secondary side plays a key role for model accuracy and stability. The models demonstrate the possibilities of commercial CFD and meshing software, the necessity of compromises between spatial resolution, porous media modelling and model limitations.

Hinweis: Alle auswärtigen Besucher des Seminars werden gebeten, ihren gültigen Personalausweis oder Reisepass mitzubringen

Karlsruher Institut für Technologie (KIT)
Kaiserstraße 12
76131 Karlsruhe
UST-IdNr. DE266749428

Präsidium:
Prof. Dr. Jan S. Hesthaven (Präsident),
Prof. Dr. Oliver Kraft, Prof. Dr. Thomas Hirth,
Prof. Dr. Kora Kristof, Dr. Stefan Schwartze

LBBW/BW Bank
IBAN: DE44 6005 0101 7495 5001 49
BIC/SWIFT: SOLADEST600

LBBW/BW Bank
IBAN: DE18 6005 0101 7495 5012 96
BIC/SWIFT: SOLADEST600