



**of the European Atomic Energy Community (Euratom)
for nuclear research and training activities (2007-2011)**

Collaborative Project

THINS

Project title: **Thermal-hydraulics of Innovative Nuclear Systems**

Project number: **249337**

Project coordinator: **Karlsruher Institut für Technologie KIT, Karlsruhe,
Germany**

FZD participant: **Institute of Safety Research**

Starting date: **01.02.2010**

Duration (months): **60**

Summary

For the long-term development of nuclear power, innovative nuclear systems such as Gen-IV reactors and transmutation systems need to be developed for meeting future energy challenges. Thermal-hydraulics is recognized as a key scientific subject in the development of innovative reactor systems. This project is devoted to important crosscutting thermal-hydraulic issues encountered in various innovative nuclear systems, such as advanced reactor core thermal-hydraulics, single phase mixed convection and turbulence, specific multiphase flow, and code coupling and qualification.

The main objectives of the project are:

- Generation of a data base for the development and validation of new models and codes describing the selected crosscutting thermal-hydraulic phenomena. This data base contains both experimental data and data from direct numerical simulations (DNS).
- Development of new physical models and modeling approaches for more accurate description of the crosscutting thermal-hydraulic phenomena such as heat transfer and flow mixing, turbulent flow modeling for a wide range of Prandtl numbers, and modeling of flows under strong influence of buoyancy.

- Improvement of the numerical engineering tools and establishment of a numerical platform for the design analysis of the innovative nuclear systems. This platform contains numerical codes of various classes of spatial scales, i.e. system analysis, sub-channel analysis and CFD codes, their coupling and the guidelines for their applications.

The project will achieve optimum usage of available European resources in experimental facilities, numerical tools and expertise. It will establish a new common platform of research results and research infrastructure. The main outcomes of the project will be a synergized infrastructure for thermal-hydraulic research of innovative nuclear systems in Europe.