

MCSAFER – HIGH-PERFORMANCE ADVANCED METHODS AND EXPERIMENTAL INVESTIGATIONS FOR THE SAFETY EVALUATION OF GENERIC SMALL MODULAR REACTORS

AIM

The aim of the McSAFER project is to advance the safety research for SMRs by combining experimental investigations and numerical simulations.

OBJECTIVES

- **Perform key experimental investigations** in European thermal hydraulic test facilities – COSMOS-H (KIT), HWAT (KTH) and MOTEL (LUT) with focus on SMR-relevant phenomena in the core and in the reactor pressure vessel to provide data for code validation.
- **Validation of thermal hydraulic codes** with the experimental data to increase the confidence in the numerical tools used for safety demonstration.
- **Improve the neutron physical**, thermal hydraulic, and thermo-mechanic simulation of SMR-cores under static and accidental conditions and demonstrate the complementarity of advanced and high-fidelity core analysis methods with traditional ones.
- **Improve the simulation of the three-dimensional thermal hydraulic phenomena** inside the reactor pressure vessel of the integrated SMR-concepts by using multiscale thermal hydraulic tools in combination with traditional one-dimensional system thermal hydraulic codes.
- **Apply the improved and validated numerical tools** for the analysis of selected accidents in SMR-plants (NuScale, SMART) and compare the results with the ones of traditional methods
- **Provide advanced computational tools** capable of performing safety analysis in accordance with the European WENRA-requirements and considering specifics of national regulatory guidelines for the near-term deployment of SMRs in Europe.
- **Demonstrate the advantages** of the use of high-fidelity codes in practical licensing process and the complementarity of low-order and high order solvers to reduce conservatism in safety demonstrations and enhance operational flexibility in a mixed grid of carbon-free electricity generation.

PROJECT START

1st September 2020

PROJECT END

31st August 2023 (36 months)

EC FUNDING

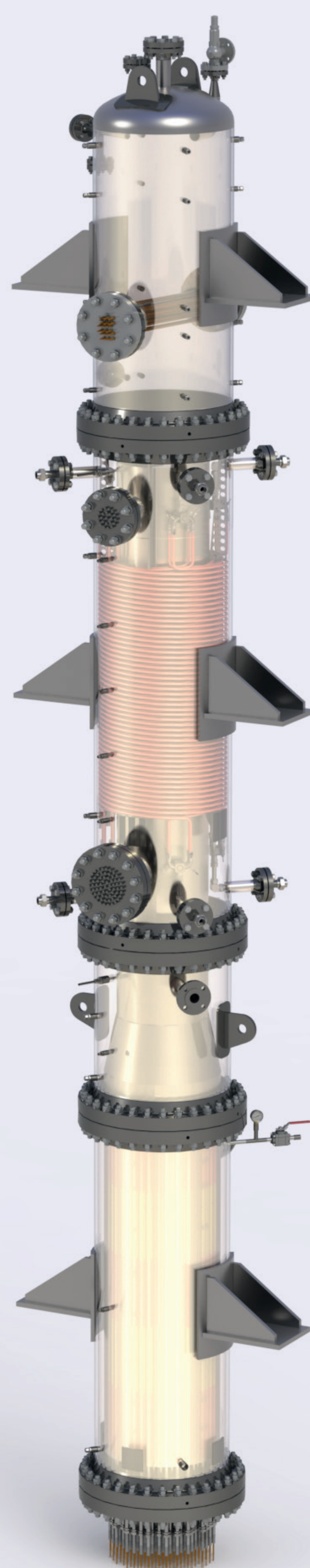
4.045.133,75 €

PARTNER

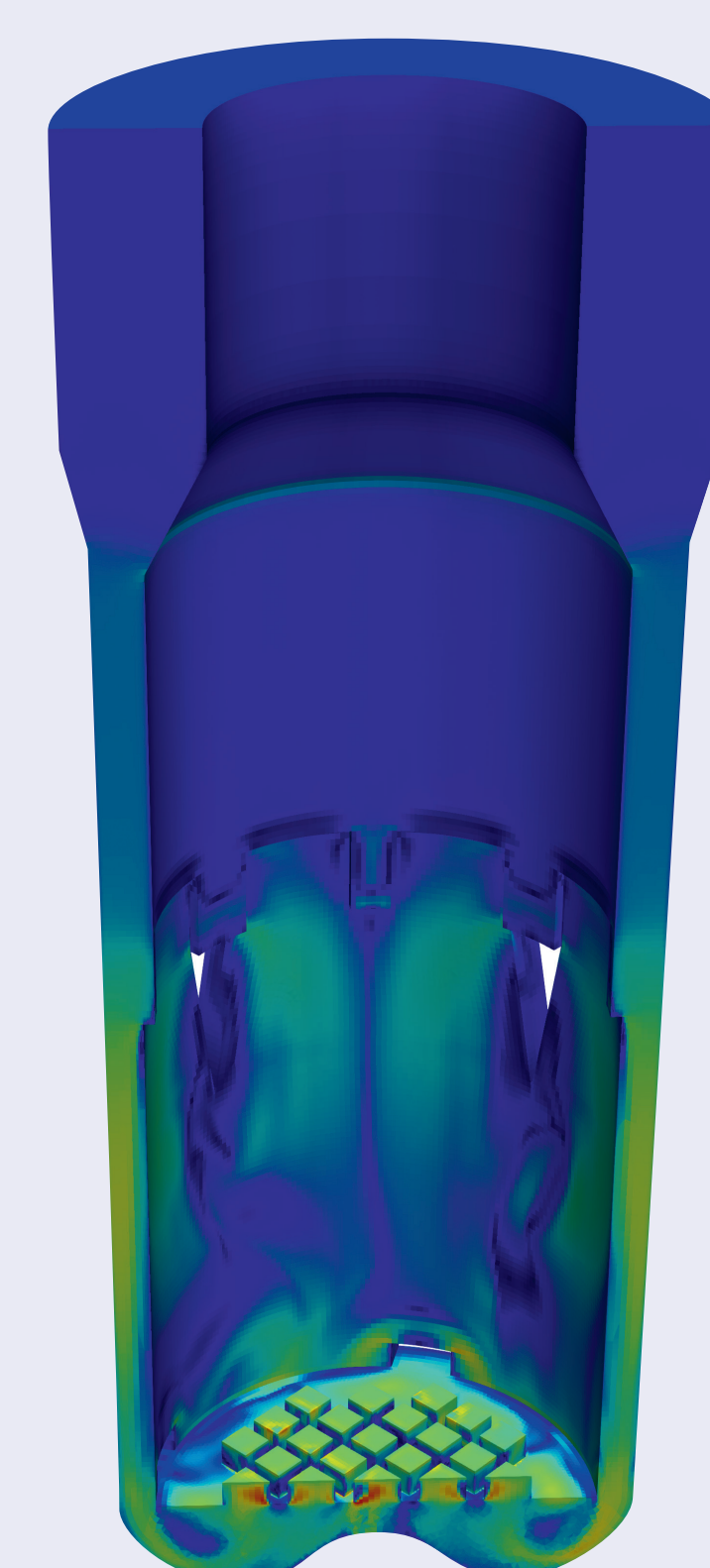


PROJECT COORDINATION

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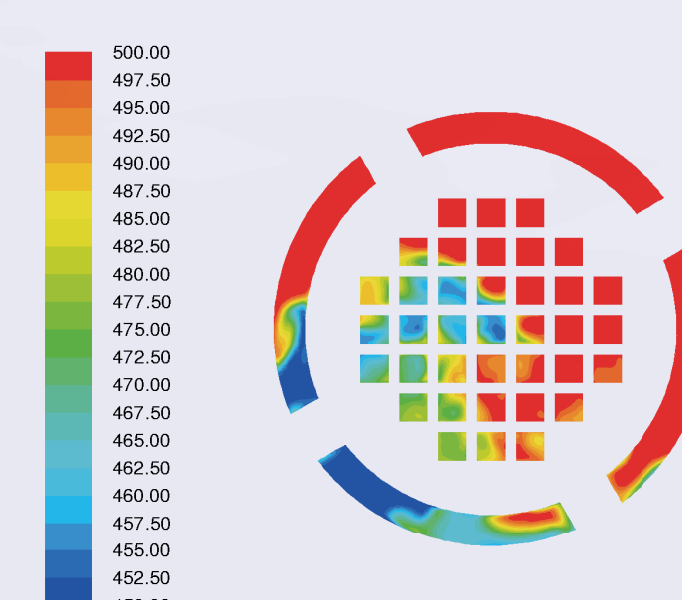


MOTEL TEST FACILITY
3D-MODEL



NUSCALE VESSEL
SCALAR MIXING

Velocity Magnitude
1.7e+00
1.4
1.2
1
0.8
0.6
0.4
0.2
8.9e-04



CONTOURS OF STATIC
TEMPERATURE (K)

500.00
497.50
495.00
492.50
490.00
487.50
485.00
482.50
480.00
477.50
475.00
472.50
470.00
467.50
465.00
462.50
460.00
457.50
455.00
452.50
450.00