MUSA

Management and Uncertainties of Severe Accidents

OBJECTIVES

The overall objective of the Management and Uncertainties of Severe Accident (MUSA) project is to assess the capability of SA codes when modelling reactor and SFP (Spent Fuel Pool) accident scenarios of Gen II and III. To do so UQ (Uncertainty Quantification) methods are to be used, with emphasis on the effect of already-set and innovative accident management measures on accident unfolding, particularly those related to ST (Source Term) mitigation. Therefore, ST related Figures Of Merit (FOM) are to be used in the UQ application.

The MUSA project proposes an innovative research agenda in order to move forward the predictive capability of SA analysis codes by combining them with the best available/improved UQ tools and embedding accident management as an intrinsic aspect of SA analyses. MUSA develops through key activities which also describe the main outcomes foreseen from the project: identification and quantification of uncertainty sources in SA analyses; review and adaptation of UQ methods; and testing such methods against reactor and SFP accident analyses, including AM.

Given the focus of FOM on source term, the project will identify variables governing ST uncertainties that would be worth investigating further. All the ingredients necessary to conduct the project are already available: analytical tools, experimental data, postulated reactor and SFP scenarios and, technical and scientific competences.

DESCRIPTION OF WORK

To carry out the MUSA work programme, seven separate but interlinked technical WPs are planned:

WP1: MUSA COordination and project management (MUCO)
WP2: Identification and Quatification of Uncertainty Sources (IQUS)
WP3: Review of Uncertainty Quantification Methodologies (RUQM)
WP4: Application of UQ Methods against Integral Experiments (AUQMIE)
WP5: Uncertainty Quantification in Analysis and Management of Reactor Accidents
WP6: Innovative Management of SFP Accidents
WP7: COmmunication and REsults DISsemination (COREDIS)

MAIN RESULTS / HIGHLIGHTS

The main outcomes to be expected from MUSA may be synthesized as:

• A systematic assessment of uncertainty bands affecting SA simulations in risk dominant sequences, particularly concerning Source Term.
• Guidelines to systematic conduct BEPU analysis in the SA domain.
• A database with the characterization (upper and lower bound and pdf) of uncertainties in input deck parameters.
• Insights into key elements affecting SAM implementation (i.e., timing).
• Additional means and actions that might optimize accident management, both in reactors and SFPs.
• Hands-on training & identification of major challenges.

DURATION

1st July 2019 – 30 June 2023
4 years

CONTACTS

Technical Project Leader:
Luis Enrique Herranz Puebla (CIEMAT)
Email: luisen.herranz@ciemat.es

PARTNERS

CIEMAT / BEL V / CEA / CNPRI / CNSC / ENEA / LLC ENERGORISK / EPRI / FRAMATOME GMBH / GRS / INRNE /IRSN / JAEA / JRC / KAERI / KIT /LEI / LGI / NINE SRL / PSI / SSTC NRS / TRACTEBEL / TUS / UNIPI / UNIRM1 / VMU / VTT / WOOD