THE MUSA PROJECT: MANAGEMENT AND UNCERTAINTIES OF SEVERE ACCIDENTS

L.E. Herranz[1], S. Beck[2], S. Brumm[3], F. Mascari[4], O. Coindreau[5], V. Sánchez-Espinoza[6], S. Paci[7]

[1]Unit of Nuclear Safety Research, CIEMAT, Spain
[2]Gesellschaft für Anlagen- und Reaktorsicherheit, GRS, Germany
[3]Joint Research Centre (Petten), European Commission, The Netherlands
[4]Agenzia Nazionale per le Nuove Tecnologie, l'Energia e lo Sviluppo Economico Sostenibile, ENEA, Italy
[5]Institut de Radioprotection et de Sûreté Nucléaire, IRSN, France
[6]Karlsruhe Institute of Technology, KIT, Germany
[7]University of Pisa, UNIPI, Italy

Abstract

Management and Uncertainties Of Severe Accidents (MUSA) project was founded in HORIZON 2020 EURATOM NFRP-2018 call on *"Safety assessments to improve Accident Management strategies for Generation II and III reactors"* and it is coordinated by CIEMAT (Spain). The project started on June 1st, 2019 and the planned duration is 48 months. The overall project cost is 5.768,452.50 Euros and 28 Organizations from 16 Countries are involved. On July 7th, 2018, MUSA project received the NUGENIA label recognizing the excellence of the project proposal.

The project aims to consolidate a harmonized approach for the analysis of uncertainties and sensitivities associated with Severe Accidents (SA) by focusing on Source Term (ST) Figure of Merits (FOM). MUSA has an "innovative research agenda" in order to move beyond the state-of-the-art regarding the predictive capability of SA analysis codes by combining them with the best available Uncertainty Quantification (UQ) tools. The achievement of the overall objective is assured by a consistent and coherent work programme, reflected in the technical Work Packages (WP) structure.

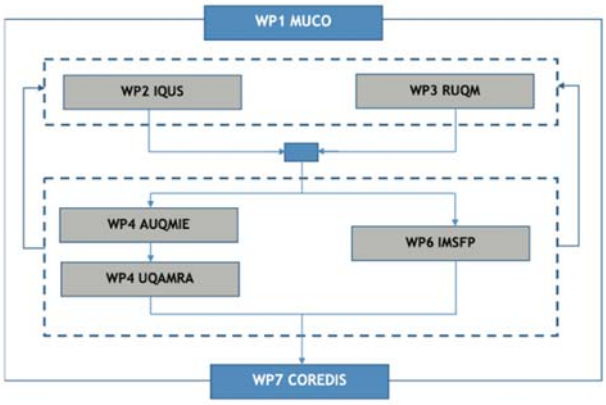

Figure 1: Musa Work Package interlink

The achievement of the overall objective is assured by a consistent and coherent work programme reflected in the technical WP structure, Figure 1. MUSA project includes: WP1, MUSA COordination and project management (MUCO) led by CIEMAT, WP2, Identification and Quantification of Uncertainty Sources (IQUS) led by GRS, WP3, Review of Uncertainty Quantification Methodologies (RUQM) led by KIT, WP4, Application of UQ Methods against Integral Experiments (AUQMIE) led by ENEA, WP5, Uncertainty Quantification in Analysis and Management of Reactor Accidents (UQAMRA) led by JRC, WP6, Innovative Management of SFP Accidents (IMSFP) led by IRSN, and WP7, COmmunication and Results DISsemination (COREDIS) led by UNIPI.

MUSA is a well structured project that aims to consolidate a harmonized approach for the analysis of uncertainties and sensitivities associated with SA by focusing on ST FOMs. Currently two years of activity have been carried out and the first results of the project are coming out. In term of identification and quantification of uncertainty sources in SA (WP2), the specific ST FOMs have been agreed between the partners and the main sources of uncertainty have been identified and characterized in term of PDF and range of input uncertainty parameters. The review of uncertainty quantification state-of art methodologies (WP3) has been developped together with the critical analyses of UaSA methodology/code to be applied. WP4 application against the simplified but representative FPT1 scenarions has been developed and it was able to train partners to applicate UQ to SA analyses; this gives the possibility to identified and solve some of the issues encountered

in this first applications as SA/UT coupling, scripting development, post processing, etc. The experience gained along the WP4 activity is the base for the NPP and SFP applications, that are currently on-going with preparatory work (e.g., development of the reference case, first reduced uncertanty applications, etc). Specific issues of NPP and SFP application have been already identified (e.g. high computational time) and partners are currently working and discussing solutions (e.g. use of HPC, reduction of the input-deck complexity, etc). The next steps of the project will be the finalization of NPP and SFP uncertainty application and, based on their feedback, develops the guidelines and reccomandation for the use of UQ in connection with SA codes.

The objective of this paper is to briefly describe the main project pillars and summarize the progress made over the first two years of research activity. Based on the current projects results, the first observations and leassons learned on the uncertainty application in the SA domain will be presented.

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