**FROM THE PLANT LAYOUTS TO AN OPTIMIZED 3D PWR-KWU CONTAINMENT MODEL WITH GOTHIC 8.3 (QA)**

L. SERRA a, A. DOMÍNGUEZ-BUGARÍN a, C. VÁZQUEZ-RODRÍGUEZ a, S. KELM b, M. BRAUN c, L.E. HERRANZ d, G. JIMÉNEZ a

*a* *Universidad Politécnica de Madrid, ETSI Industriales. José Gutiérrez Abascal, 2. 28006 Madrid, Spain*

*b Forschungszentrum Jülich GmbH, 52425 Jülich, Germany*

*c* *Framatome GmbH, 91052 Erlangen, Germany*

*d* *CIEMAT, 28040 Madrid, Spain*

*\*Corresponding author:* [*luis.slopez@alumnos.upm.es*](mailto:luis.slopez@alumnos.upm.es)*; +34 669905026*

Containment geometry characteristics play a key role in many accident and severe-accident phenomena, such as flammable gas distribution, accumulation and deflagration dynamics. The containment buildings of nuclear power plants have complex geometries and extracting the data required to build detailed computational models from plant layouts is a demanding task. Using Computational Aided Design (CAD) software as a cornerstone of the modelling process serves as a bridge between the containment layouts and the thermal-hydraulic models. This work will describe all the steps of the methodology used to build a 3D PWR-KWU containment model in GOTHIC from its detailed CAD model. Firstly, an intermediate model with several geometric simplifications will be developed in the CAD environment. These simplifications are intended to avoid problematic configurations when adapting the actual geometry to the porous cartesian mesh of GOTHIC, avoiding numerical instabilities and resulting in shorter simulation times. The simplified geometry is imported into GOTHIC, and it is tested by simulating a Large Loss of Coolant Accident (LB-LOCA) in one of the cold legs. This is the most convenient scenario to check the specific numerical instabilities within the porous cartesian space discretization of GOTHIC, which mainly arise from the massive release of mass and energy during the blowdown. Although the initial containment model did perform adequately in the initial phases of the LOCA, a detailed assessment of the numerical stability revealed several points for improvement in further stages of the simulation. Namely, the accumulation of liquid in sump-type regions with low-porosity problematic cells, hampered the simulation at specific periods of time. Then, the final modifications of the geometry achieved a reduction of the computational costs up to one order of magnitude. Part of this work is included within the AMHYCO project (Euratom 2019-2020, GA No 945057) which main objective is to improve experimental knowledge and simulation capabilities for the H2/CO combustion risk management in nuclear power plant containments during severe accidents (SAs).