Contribution ID: **23111** Type: **Paper**

Numerical Prediction of Flow and Heat Transfer in a Molten Corium Pool

Tuesday, 14 November 2023 10:00 (5 minutes)

The integrity of the reactor pressure vessel (RPV) is of the utmost importance in nuclear reactor safety. One of the cases that need to be studied more thoroughly is the formation of a corium pool which could happen during severe accident scenarios. The melted core is a mixture of multiple melted materials, giving the fluid a unique flow structure. Additionally, the presence of high-temperature variations within the corium pool causes an extremely high Rayleigh number for a natural convection flow regime. This unique problem requires significant research efforts. This paper studies a semi-oval vessel with internal heat generation representing high-temperature melted core and corresponds to the famous BALI experiments. In this context, a wide range of RANS (Reynolds-Averaged Navier-Stokes) based CFD (Computational Fluid Dynamics) simulations are performed to better understand the complex thermal-hydraulics phenomena in a corium pool. Additionally, a comparative study is performed to assess the prediction capabilities of different RANS models.

Speaker Bio

Primary authors: BALABAID, ABDALLAH (Chemical Engineering); SHAMS, Afaque (Mechanical Engineering); AL GAZLAN, OSAMAH (Chemical Engineering); SIDDIQUI, Osman (KFUPM-Mechanical Engineering)

Presenter: BALABAID, ABDALLAH (Chemical Engineering)

Session Classification: Day 2- Research Pitch Competition - I

Track Classification: Student competition