

## ABSTRACT

### A CFD MODELING FOR TRANSIENT 3D GAS-LIQUID COUNTER-CURRENT TWO-PHASE FLOW IN A UPTF PWR HOT LEG

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A CFD simulation was successfully performed to investigate the counter-current two-phase flow limitation (CCFL) in a full scale reactor geometry of UPTF Test. No 11. The simulation was conducted at *Helmholtz-Zentrum Dresden-Rossendorf* (HZDR), by using a commercial CFD code of ANSYS CFX 13.0. The transient calculations were carried out using a gas/liquid inhomogeneous multiphase flow model coupled with a shear stress transport (SST) turbulence model.

In this simulation, the drag coefficient of  $C_D = 0.44$  and the newly developed correlation of the drag coefficient (Höhne & Vallée, 2010) in the Algebraic Interfacial Area Density (AIAD) model were implemented. The results indicated a good agreement between calculation and experimental data on the CCFL characteristics and water level inside the hot leg.

**Keywords:** Computational fluid dynamics (CFD), Counter-current flow limitation (CCFL), Upper plenum test facility (UPTF), Pressurized Water Reactor (PWR), Hot leg, Algebraic interfacial area density (AIAD), Drag coefficient.