**The progress report on the ISTC Project #3876 (THOMAS)**

obtained during 7-8 Quarters

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The 2-D stand-alone code developed to simulate (in the simplified geometry of the tests) simultaneous UO2 fuel dissolution, U-Zr-O corium melt oxidation accompanied with the bulk ceramic precipitates formation and oxidation of the steel wall of a vessel in contact with corium, was transformed in the previous stage of the Project (Quarters 5-6) into the 1-D corium melt – steel oxidation module, in order to describe local interactions at the corium-steel interface (in the geometry of the pressure vessel). This allowed to exclude from the code a simplified description of the heat and mass exchange between the U-Zr-O corium melt and peripheral crusts, and to use (in future) detailed thermo-hydraulic approach of the CONV code.

The work for further development and testing against experimental data of the 1-D oxidation numerical module that simulates evolution of the solid phase layers ((Zr,U)O2-x crust, FeO corrosion layer and steel), temperature distributions in the layers and U, Zr, O molar fluxes into the melt, was continued. Further improvement of interface program unit for coupling of the melt – steel oxidation 1-D module with the corium melt 2-D thermo-hydraulic code was continued.

Preparatory work with the code CONV 2D sources for implementation of melt oxidation model, and also interface (input files) for insert of physicochemical melt oxidation model for modeling of thermal hydraulic behavior of U-Zr-O melt under oxidizing conditions for small and medium scale experiments in code CONV 2D was continued.

Designing the interface program unit for the representation of a minimum parameter set for melt – steel oxidation 1-D module was continued. The given set includes an additional orthogonal grid, on which the quasi one-dimensional melt oxidation model will be solved. The grid will be connected by the boundary conditions with a base calculated grid of CONV code. Besides the parameter set includes characteristics of materials, participating during oxidation, which with the help of the interface program will be transformed to a set of entering files for CONV code, taking into account the chemical structure (molar composition), property (thermal capacity, thermal conduction, denseness, viscosity), temperature cooperating steel and melt for an interchanging with melt oxidation model.

Testing the modernized (parallel) version of CONV code was continued on such tests as T-junction thermal mixing test. A good agreement for the finest grids up to 40 millions nodes was obtained.