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HYBRID SIMULATION OF HEAT TRANSFER PROBLEMS IN STRUCTURAL APPLICATIONS – COUPLED PROBLEMS 2015

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Abstract. The present paper presents all research activities focused on the development of a pure thermal hybrid simulator (THS). In detail, the need for a rigorous coupling is investigated, i.e. temperatures are sent from the numerical substructure (NS) to the physical substructure (PS) and interface heat fluxes are sent back from the PS to the NS. In this respect, a realistic benchmark case study is presented. It consists of a 2D truss bridge where a single truss element is "physically" substructured. In the current preliminary phase, an additional multiphysics FE code, COMSOL, is utilized to simulate the thermal response of this "experimental" substructure inside the electric furnace. In detail, two variants of the same case study are presented and characterized by two significantly different average thermal diffusivities. This approach provides a realistic insight into the capabilities of THS. Moreover, the present study paves the way for the implementation of a fully coupled thermomechanical hybrid simulation (TMHS), which account for indirect actions owing to restrained thermal deformations on the hot NS.