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## P3.178 Development of a SIMMER\RELAP5 coupling technique: a preliminary application to the LIFUS5/Mod3 test facility

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The In-Box Loss Of Coolant (LOCA) postulated accident is considered as a major concern for the safety involving the development of EU-DEMO fusion reactor. Related to the renewed interest in the Water Cooled Lithium Lead (WCLL) blanket concept, a unique and innovative experimental campaign is under development at ENEA Brasimone research center aiming at investigating consequences of an In-Box LOCA event applied to the WCLL Breeding Blanket (BB). The LIFUS5/Mod3 experimental facility - and its related tests campaign - is aimed at investigating the PbLi/water chemical interaction after the occurrence of the postulated accident. Experimental data obtained from this LIFUS5/Mod3 experimental campaign are also of fundamental importance for the verification and validation of software codes applied to the deterministic safety analysis of the WCLL BB concept. In this frame, the University of Pisa developed a modified version of the SIMMER-III code implementing PbLi/water chemical interaction to account for the direct energy release in terms of temperature and pressure increases inside the BB.

In this paper, an in-house coupling tool between SIMMER and RELAP5 codes (modified versions implementing respectively PbLi/water chemical interaction and PbLi thermo-physical properties) is presented together with its preliminary application to the LIFUS5/Mod3 pre-test simulation. The coupling procedure can be classified as a “two way”, “non-overlapping”, “online” technique aiming at investigating multi-physics and multi-scales phenomena in support of the development of fusion technologies. The application of the 2D Thermal-hydraulic SIMMER code limited to the LIFUS5/Mod3 main vessel allows to simulate the chemical interaction between PbLi/water, while the water injection line - simulated by the RELAP5 code - supplies accurate boundary conditions to the SIMMER.

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