

## **MAGNETOHYDRODYNAMIC PRESSURE DROPS IN GEOMETRIC ELEMENTS FORMING A HCLL BLANKET MOCK-UP: IDENTIFICATION OF CRITICAL CONTRIBUTIONS**

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The helium cooled lead lithium (HCLL) blanket concept is one of the designs that will be tested and validated in the experimental fusion reactor ITER. The liquid metal is slowly circulated in the blanket and interacts with the intense magnetic field that confines the plasma leading to modifications of velocity and pressure distributions compared to those expected in hydrodynamic flows. These changes are caused by magnetohydrodynamic (MHD) phenomena related to the occurrence of induced electric currents and electromagnetic forces.

Experiments have been performed to investigate MHD flows in a scaled mock-up of a HCLL blanket. The aim is identifying those geometric elements that give rise to the main contributions to the total pressure drop in the test section. Parametric studies have been carried out to assess the influence of flow rate and magnetic field intensity on pressure heads at various positions. The largest pressure differences are measured along the pipe and duct systems used to distribute and collect the liquid metal. Significant pressure drops occur also when the lead-lithium flows across the openings at the back plate that join manifolds and breeder units. It has been observed that even for strong imposed magnetic fields inertia forces still affect the pressure distribution in particular locations inside the blanket, like for instance at the first wall where two adjacent units are connected through a narrow gap. Results allow suggesting specific modifications to the blanket design, focusing on the improvement of the magnetohydrodynamic performance at some identified critical points in the modules.