Contribution ID: **500** Type: **not specified**

P4.165 Experimental study of liquid metal magnetohydrodynamic flows near gaps between flow channel inserts

Thursday, 20 September 2018 11:00 (2 hours)

In dual-coolant lead lithium blankets, foreseen in fusion power plants, the liquid metal PbLi flows at sufficiently large velocity to guarantee a suitable removal of the volumetric heat generated in the fluid. The moving electrically conducting fluid under the influence of the plasma-confining magnetic field induces currents that create strong electromagnetic Lorentz forces and a high magnetohydrodynamic pressure drop. Electrically insulating flow channel inserts (FCI) are foreseen for decoupling electrically the liquid metal flow from the well-conducting walls. This reduces currents and associated Lorentz force that is responsible for the major contribution to pressure drop in the blankets. Due to geometrical and manufacturing restrictions, it could be necessary to insert FCIs in several pieces in the long poloidal channels. This leads to the presence of gaps between the inserts, namely to interruptions of the electrical insulation, thus providing local shortcut for currents.

The present paper focuses on experimental studies of three-dimensional liquid metal magnetohydrodynamic flows near gaps between FCIs with the purpose to demonstrate the benefits of the inserts for pressure drop reduction and to quantify the additional pressure drop near the gap that has been predicted by theoretical analyses. Experiments are performed in the MEKKA laboratory at the Karlsruhe Institute of Technology in a parameter range typical for dual-coolant blankets. As test section a circular pipe is used, in which sandwich-type FCIs are inserted. The flow is analyzed by measuring pressure differences along the pipe and electric potential in the fluid and on the walls.

Presenter: BÜHLER, Leo (IKET Karlsruhe Institute of Technology)

Session Classification: P4