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Experimental study of MHD flow with SiC flow channel inserts for fusion blanket applications

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In this work there are presented experimental results from magnetohydrodynamic (MHD) flow study in a strong magnetic field up to 5T, performed on the superconducting magnet, in IPUL (Institute of Physics of the University of Latvia). The aim of this experiment is to evaluate the performance of electrical insulation introduced in the PbLi duct by use of SiC flow channel inserts. They are manufactured in several new shapes and made by gel casting method with chemical vapour deposition, that was done in CIEMAT/CEIT (Spain). These inserts act as a barrier for the induced electrical currents, thus not allowing them to penetrate and to close through the stainless steel walls of the PbLi channel. This results in a reduction of total induced electric current density inside the liquid metal. That further leads to a decrease of unwanted MHD pressure drop, that typically occurs in a Dual-coolant Lead-lithium (DCLL) fusion blankets due to inevitable presence of a strong magnetic fields in tokamak reactor.

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