

Abstract Submitted
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Recent Advances in Applicability of TEMHD Driven Liquid Lithium as a Fusion Relevant PFC MATTHEW SZOTT, PETER FIFLIS, KISHOR KALATHIPARAMBIL, DAVID N. RUZIC, University of Illinois at Urbana-Champaign — Liquid lithium displays increasing promise as a replacement to solid plasma facing components (PFC) in fusion device applications. Liquid PFCs reduce erosion and thermal stress damage, prolonging device lifetime, while lithium has been shown to decrease edge recycling, reduce impurities, and enhance plasma performance. The Liquid Metal Infused Trench (LiMIT) concept developed at UIUC successfully demonstrates horizontal and vertical thermoelectric magnetohydrodynamic (TEMHD) flow of liquid lithium through metal trenches for use as a PFC. Installed in the HT-7 tokamak and at the Magnum-PSI linear plasma device, the system performed effectively in fusion relevant conditions. In high heat flux tests, trench dry-out was observed, which exposes solid trench material due to higher TEMHD force on the area with the highest heat flux. A 3D free surface fluid model of dry-out and experimental tests conducted to mitigate the detrimental effect are described. The final designs for the upcoming test of LiMIT as a limiter for the EAST tokamak are discussed, along with velocity characteristics of steady-state TEMHD driven flow through the LiMIT system inclined up to 180 degrees from horizontal, which is necessary for broad applicability of a liquid lithium PFC system.

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