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Improving Heat Flux Handling of TEMHD-Driven Liquid Lithium PFCs[1] MATTHEW SZOTT, STEVEN STEMMLEY, DAVID NEIL RUZIC, University of Illinois at Urbana-Champaign — Liquid lithium displays increasing promise as an alternative to solid plasma facing components (PFC) in fusion device applications. Liquid lithium PFCs reduce erosion and thermal stress damage, prolonging device lifetime, and have 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. The LiMIT device has been successfully tested at UIUC and in devices around the world, including the HT-7 tokamak and the Magnum PSI linear plasma device, at heat fluxes up to 3 MW/m^2. As peak heat flux increases, lithium dryout is possible due to strong thermal gradients. Maintaining a steady flowing liquid surface in the face of extreme heat fluxes is imperative for continued application of flowing liquid lithium PFCs. To that end, novel geometries are being developed that maintain the propensity for TEMHD flow while eliminating the risk of dryout. Results of computational modeling and experimental testing will be presented.

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