

Abstract Submitted  
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**Design and Modeling of a Liquid Lithium LiMIT Loop<sup>1</sup>**

MATTHEW SZOTT, MICHAEL CHRISTENSON, STEVEN STEMMLEY, CHISUNG AHN, DANIEL ANDRUCZYK, DAVID RUZIC, University of Illinois at Urbana-Champaign — The use of flowing liquid lithium in plasma facing components has been shown to reduce erosion and thermal stress damage, prolong device lifetime, decrease edge recycling, reduce impurities, and increase plasma performance, all while providing a clean and self-healing surface. The Liquid Metal Infused Trench (LiMIT) system has proven the concept of controlled thermoelectric magnetohydrodynamic-driven lithium flow for use in fusion relevant conditions, through tests at UIUC, HT-7, and Magnum PSI. As the use of liquid lithium in fusion devices progresses, emphasis must now be placed on full systems integration of flowing liquid metal concepts. The LiMIT system will be upgraded to include a full liquid lithium loop, which will pump lithium into the fusion device, utilize TEMHD to drive lithium through the vessel, and remove lithium for filtration and degassing. Flow control concepts recently developed at UIUC – including wetting control, dryout control, and flow velocity control – will be tested in conjunction in order to demonstrate a robust system. Lithium loop system requirements, designs, and modeling work will be presented, along with plans for installation and testing on the HIDRA device at UIUC.

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