Abstract Submitted
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Effect of Energetic Plasma Flux on Flowing Liquid Lithium Surfaces[1] KISHOR KALATHIPARAMBIL, SOONWOOK JUNG, MICHAEL CHRISTENSON, PETER FIFLIS, WENYU XU, MATHEW SZOTT, DAVID RUZIC, CPMI, Department of Nuclear, Plasma and Radiological Engineering, University of Illinois at Urbana-Champaign — An operational liquid lithium system with steady state flow driven by thermo-electric magneto-hydrodynamic force and capable of constantly refreshing the plasma exposed surface have been demonstrated at U of I [1]. To evaluate the system performance in reactor relevant conditions, specifically to understand the effect of disruptive plasma events on the performance of the liquid metal PFCs, the setup was integrated to a pulsed plasma generator. A coaxial plasma generator drives the plasma towards a theta pinch which preferentially heats the ions, simulating ELM like flux, and the plasma is further guided towards the target chamber which houses the flowing lithium system. The effect of the incident flux is examined using diagnostic tools including triple Langmuir probe, calorimeter, rogowski coils, Ion energy analyzers, and fast frame spectral image acquisition with specific optical filters. The plasma have been well characterized and a density of $\sim 10^{21}$ m^{-3}, with electron temperature $\sim 10 - 20$ eV is measured, and final plasma velocities of 34 – 74 kms^{-1} have been observed. Calorimetric measurements using planar molybdenum targets indicate a maximum plasma energy (with 6 kV plasma gun and 20 kV theta pinch) of 0.08 MJm^{-2} with plasma divergence effects resulting in marginal reduction of 40 ± 23 J in plasma energy. Further results from the other diagnostic tools, using the flowing lithium targets and the planar targets coated with lithium will be presented. [1] D. N. Ruzic et. al, Nuc. Fusion **52** 102002 (2011)

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