

Abstract Submitted  
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**Using Non-Axisymmetric Scrape-Off Layer Current to Control Edge-Localized Modes and Equilibrium Profiles**<sup>1</sup> ILON JOSEPH, RON COHEN, TOM ROGNLIEN, Lawrence Livermore National Lab — Control of both the time-averaged divertor heat loads and the impulsive heat fluxes that accompany edge-localized modes is critical to the success of future tokamaks, including ITER. Driving toroidally non-axisymmetric current through the scrape-off layer (SOL) plasma can achieve both goals simultaneously by broadening the SOL by driving radial convection [1] and by driving edge-resonant magnetic perturbations in order to control the edge pressure gradient [2]. We analyze reactor-relevant SOL current-drive mechanisms that reduce power requirements and do not require internal insulators using analytic theory and reduced 1d and 2d numerical models using the UEDGE code. Calculations show that toroidally localized puffing and pumping of neutral gas and/or impurities can generate substantial SOL current and that choosing the appropriate mode number, width and phasing at the target plate can amplify the desired effects.

[1] R.H. Cohen and D.D. Ryutov, Nucl. Fusion 37, 621 (1997).

[2] I. Joseph, R.H. Cohen and D.D. Ryutov, Phys. Plasmas 16, 052510 (2009).

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Ilon Joseph  
Lawrence Livermore National Lab

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