

Abstract Submitted  
for the DPP11 Meeting of  
The American Physical Society

**Amplifying and Transforming of External Error Field by Scrape-Off-Layer Current (SOLC) in Tokamaks**<sup>1</sup> HIRONORI TAKAHASHI, ERIC FREDRICKSON, STEFAN GERHARDT, STEWART ZWEBEN, Princeton Plasma Physics Laboratory — External error fields may induce a thermoelectrically driven SOLC, if the fields produce  $T_e$  differences between the two ends of open field lines. SOLC may in turn generate an error field of its own that is greater in amplitude and more destructive in nature than the external fields. The SOLC-generated field tends to be symmetrized in the face of non-axisymmetry in the SOL plasma because of “phase mixing effect” arising from strong shear in the field line pitch angle. Near a “sweet spot,” midway between primary and secondary separatrices, however, field lines tend to stay bundled together under opposite influences of the two separatrices, and current along these field lines can generate a low toroidal-harmonic error field in spite of the axisymmetry of the background field. A unit line SOLC (kA) in NSTX can generate an  $n=1$  harmonic of amplitude in the magnetic axis plane of  $\sim 3$  mT/kA at inboard q95, rapidly decaying to  $\sim 0.2$  mT/kA at the axis, and to  $\sim 0.03$  mT/kA at outboard q95, which may play a role in rotation slow-down/locking and other MHD phenomena.

<sup>1</sup>Supported in part by the US DOE under DE-AC02-09CH11466.

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Date submitted: 26 Jul 2011

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