

Abstract Submitted
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Idiosyncratic Features of 3D Field Produced by Current-Carrying Flux Tubes in the Scrape-Off-Layer (SOL) of Tokamaks¹ HIRO TAKAHASHI, Princeton Plasma Physics Laboratory — Magnetic field produced by toroidally asymmetric Scrape-Off-Layer Currents (SOLCs) can mimic on superficial levels field observed with the Mirnov diagnostic that may be interpreted as MHD modes of low toroidal harmonic numbers, such as RWMs, ELMs, NTMs, EHOs, and locked modes. This work focuses instead on idiosyncratic spatial features that SOLC-generated field also possesses with the possibility in mind of exploiting them in experiments for determining whether or not some or all of field traditionally attributed to MHD modes in fact originates from SOLCs. While the ion saturation current density and the field-line incident angle where current-carrying flux tubes meet solid surfaces limit the magnitude of currents that can flow in the SOL under stationary conditions, the overall structure of the flux tubes determines the effectiveness of such currents per unit magnitude in generating an asymmetric field component. This work will calculate 3D field generated by currents in flux tubes at an ion saturation current density limit, identify its idiosyncratic spatial structures, and quantify its magnitude.

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