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The Structure of Flux Tubes for Generating Toroidal Asymmetry in the Tokamak Scrape-Off-Layer (SOL)[1] HIRONORI TAKAHASHI, ERIC FREDRICKSON, Princeton Plasma Physics Laboratory — Creating and maintaining a tokamak discharge involve toroidally localized operations, including particle and heat inputs through gas puffing and neutral beam and pellet injections. In the main plasma, the injected particle and heat distributions become toroidally symmetric through rapid transport along infinitely long field lines forming irrational magnetic surfaces. But in the SOL, rapid transport along open finite-length field lines, which end on a structural component, can result in a toroidally asymmetric region (flux tube) with properties distinguishable from those of its surroundings. Of particular interest is a flux tube carrying field-aligned current, thermoelectrically driven by an electron temperature difference between its two ends. This work investigates the efficacy of such Scrape-Off-Layer Current (SOLC) in generating error field in an otherwise magnetically symmetric tokamak as a function of the flux tube structure, and explores the possibility that SOLC-generated error field contributes to strong plasma rotation braking often observed when the SOL magnetic structure rapidly evolves in an early discharge phase.

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