

Abstract Submitted
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Flux-surface closure during resistive-MHD simulations of Coaxial Helicity Injection (CHI) in NSTX¹ E.B. HOOPER, LLNL, C.R. SOVINEC, U. Wisconsin, R. RAMAN, U. Washington, FATIMA EBRAHIMI, U. New Hampshire, J.E. MENARD, PPPL — CHI in STs offers considerable promise for generating startup plasmas, with NSTX experiments demonstrating coupling to Ohmic drive with magnetic flux savings.² Success in these experiments depends in part on the achievement of flux closure following CHI voltage crowbarring. Flux closure is demonstrated here in whole-device, resistive MHD simulations using the NIMROD code. In axisymmetric plasmas significant closure due to resistive effects requires the injection slot to be narrow (e.g. 4 cm vs. 11 cm) in agreement with experiment. In simulations reduction of the applied injector flux following the crowbar forms an X-point close to the bottom of NSTX that significantly enlarges the closed volume; closure is not seen if the flux is held constant. The physics of closure will be discussed and applied to maximizing the volume. Effects of a background plasma in simulations of flux formation and closure will also be described.

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²R. Raman et al., Phys. Rev. Letters 104, 095003 (2010).

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