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Full flux closure and equilibrium state during simulations of Coaxial Helicity Injection in NSTX-U F. EBRAHIMI, Princeton University, R. RAMAN, University of Washington — A large-volume flux closure during transient Coaxial Helicity Injection (CHI) experiments in NSTX-U is demonstrated through resistive MHD simulations. Several major updates, including the location of CHI poloidal coils, are planned to improve the CHI start-up phase in NSTX-U. Simulations in the NSTX-U configuration with fixed coil currents show that with strong flux shaping the injected open field lines (injector flux) could rapidly reconnect and form a large volume of closed flux surfaces. This is achieved by driving parallel current in the injector flux coil and oppositely directed currents in the flux shaping coils to form a narrow flux footprint and push the injector flux. As the helicity and plasma are injected into the device, the oppositely directed field lines in the injector region (a) are forced to reconnect and form a current sheet (b) or spontaneously to reconnect when the elongated current sheet becomes MHD unstable. Simulations in NSTX-U also show that the magnetic pressures around the enclosed flux surface would support a steady configuration to allow a good start-up equilibrium after the injector voltage is turned off. Supported by DOE-FG02-12ER55115.

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