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Transient CHI Solenoid-free Plasma Startup in NSTX R. RAMAN, T.R. JARBOE, B.A. NELSON, U-Washington, M. BELL, D. MUELLER, PPPL, NSTX Research Team — A new method of non-inductive startup, referred to as *transient* coaxial helicity injection (CHI), has been successfully developed on the HIT-II experiment to produce 100kA of closed-flux toroidal current [R. Raman et al., Nucl. Fusion **45** (2005) L15-L19]. The plasma current is produced by discharging a capacitor bank across the lower divertor plates in the presence of toroidal and poloidal magnetic fields. The initial static magnetic flux is chosen such that this rapidly expanding plasma has a tendency to detach from the lower divertor electrodes. Rapidly reducing the injector current during this phase eases the detachment process, which results in the production of a robust closed field line equilibrium. In recent on-going discharges in NSTX, discharges with up to 140 kA of toroidal current have produced with current multiplication factors approaching 170 towards the end of the discharge, approaching conditions necessary for the observation of toroidal current persistence after the injector current is reduced to zero. DOE Contract No. DE-AC02-76CH03073 and DE-FG03-99ER54519 supports this work.

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