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Developing a compact toroid injector in the ThermoElectric driven Liquid metal plasma facing Structures device[1] MICHAEL CHRISTENSON, MATTHEW SZOTT, KISHOR KALATHIPARAMBIL, University of Illinois at Urbana-Champaign, CARL SOVINEC, University of Wisconsin - Madison, DAVID RUZIC, University of Illinois at Urbana-Champaign — The ThermoElectric-driven Liquid-metal plasma-facing Structures (TELS) device at the University of Illinois is a theta-pinched, plasma-material interaction test stand used to simulate extreme events in the edge and divertor regions of a tokamak plasma. Previous measurements of the electron and ion temperatures have shown that the isotropic heat load on target ranges between 0.1 and 0.2 MJ m^{-2} over a pulse lasting 0.2 ms. While this compares well to the heat loads from Type 1 ELMs in larger toroidal devices, it is still much less than the energy deposition from Type 1 ELMs expected in ITER, which are in excess of 1 MJ m^{-2}. To this end, a compact toroid (CT) injector has been proposed as a modification to the existing TELS device. By using an externally applied bias field to force reconnection at the muzzle of the coaxial plasma accelerator source that drives ionization, NIMROD MHD simulations have shown a peak magnetic flux of 3.5 mWb is reached 0.025 ms into the pulse - more than sufficient to form a CT. Early calorimetry and magnetic field measurements indicate that a new plasma structure has been formed in the magnetized coaxial plasma source. This work presents the current results of CT generation with respect to the bias field strength as well as the coaxial source geometry.

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