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Magnetic field structure evolution in RMF plasmas YURI PETROV, XIAOKANG YANG, TIAN-SEN HUANG, Prairie View A&M University — A study of magnetic field structure evolution during 40-ms plasma discharge had been performed in 80 cm long / 40 cm OD cylindrical chamber. Plasma current Ip$\sim$2–3 kA is produced by applied 500 kHz rotating magnetic field. In experiments, the 2D profile of plasma current is changed by feeding a 10-ms pulse current to additional magnetic coil located at the midplane. Using newly developed magnetic field pick-up coils system, we scanned the magnetic field in cross-section of plasma. Two experimental regimes were studied: without external toroidal field (TF), and with TF produced by applied axial current. When a relatively small current (<0.5 kA) is applied to the midplane coil, in both cases the total plasma current measured with Rogowski coil experiences a jump (up to 100%), but the profile of current remains almost unchanged. When a larger current (1–2 kA) is applied to the midplane coil, the total plasma current drops; the magnetic structure changes differently in two regimes. In regime without TF, the magnetic field of plasma current is reversed at R<a/2, so that two oppositely directed current layers are formed. In regime with TF, the plasma current first extends along Z, and then two rings of current are formed at the edge. At smaller radii, the current layer is still approximately uniform along Z. We also show how the magnetic field evolves during initial 1–3 ms transitional period of plasma formation.

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