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Comparison of Rotamak Plasma Discharges in Cylindrical and Spherical Devices XIAOKANG YANG, YURI PETROV, TIAN-SEN HUANG, Prairie View A&M University — A new cylindrical chamber rotamak device with one additional magnetic coil added in the middle plane has been built and operated at Prairie View Plasma Physics Lab. A series of experiments in the cases with and without a toroidal field have been performed. The measured plasma current, density and electron temperature are roughly same as those measured in our spherical chamber device operated under the same RF generator power (200 KW / 0.5 MHz) and gas filling pressure (1.3 mTorr). In the case without a toroidal field, the typical plasma parameter for cylindrical device is $I_p = 2.1$ kA, $T_e = 15$ eV, and $n_e = 1.2 \times 10^{12}$ cm⁻³; in the case with a toroidal field, $I_p = 2.7$ kA, $T_e = 25$ eV, and $n_e = 1.4 \times 10^{12}$ cm⁻³. The results from both devices confirm that configuration with toroidal field is more stable and allows to achieve higher I_p with proper choice of toroidal field. Results from cylindrical chamber device show that total plasma current can be increased from 2.2 KA to 3 KA when 400A current is applied to the midplane coil.

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