Spherical tokamak Globus-M2: first results

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The Globus-M2 spherical tokamak [1] is a substantially upgraded version of the Globus-M machine [2] with maximal increase of technical parameters to achieve the promising physical parameter area with sub-fusion temperature value and collisionality much less than unity. All parameters will be reached in compact geometry analogous to the Globus-M magnetic configuration and with the plasma current 0.5 MA and the toroidal magnetic field 1 T.

Magnetic field and plasma current increasing in Globus-M2 led us to complete redesign of the electromagnetic system due to new plasma equilibrium requirements and significant rise of mechanical and thermal loading with respect to Globus-M [3]. High grade materials were used in electromagnetic system manufacturing. Inner segments of the toroidal magnetic field coils and central solenoid were made from cold extruded copper alloy hollow conductors. All poloidal magnetic field coils are water cooled too. The electromagnetic system support structure is enhanced by the upper supporting ring jointed to the lower one by four load-bearing crosspieces which reduces displacement of the toroidal field coil below 3mm under maximal load. Also novel design of coils allows toroidal field ripple minimization down to 0.4% at the plasma outer boundary. In the Globus-M2 tokamak the vacuum vessel and the in-vessel components remain the same that allows reducing of the project costs. Power supply upgrade was performed to achieve the ultimately high currents in the toroidal magnet and central solenoid too.

Fist plasma in Globus-M2 is expected to be achieved by the end of 2017. The results of fist experimental campaign are discussed in the report.

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