Contribution ID: **3474** Type: **not specified**

P4.1098 Magnetic configuration and plasma breakdown in the spherical tokamak Globus-M2

Thursday, 11 July 2019 14:00 (2 hours)

See the full abstract here:
http://ocs.ciemat.es/EPS2019ABS/pdf/P4.1098.pdf

This paper describes characteristics of plasma inductive start-up in the spherical tokamak Globus-M2. The Globus-M2 [1] is the result of Globus-M upgrade, based on the replacement of toroidal and poloidal magnetic coils in order to increase the toroidal magnetic field and the plasma current by 2-2.5 times up to B_T = 0.8-1 T and I_P = 0.4-0.5 MA. The vacuum vessel remained the same. The plasma inductive breakdown is performed by means of the central solenoid with total stored magnetic flux of 0.4 Wb at the current swing ±70 kA. At the moment of plasma breakdown the solenoid stray magnetic field within the breakdown region is about 0.04 T. This stray field is compensated by a set of external poloidal field (PF) coils. The magnetic configuration in the breakdown stage is determined by processing signals of 21 flux loops installed on the vacuum vessel surface. Also the input signals for the magnetic reconstruction are currents in PF coils, current in the central solenoid and induced toroidal currents in the vacuum vessel, determined from flux loop data. The paper presents distributions of the poloidal magnetic flux and the module of the poloidal magnetic field inside the vessel in the plasma breakdown stage. The range of hydrogen pressures and electric field at which steady breakdown occurs is determined.

References: [1] V.B. Minaev, V.K. Gusev, Y.V. Sakharov et al, Nucl. Fusion 57, 066047 (2017).

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Session Classification: Poster P4

Track Classification: MCF