Recent Progress in the SUNIST Spherical Tokamak

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An improved repeatability of the ohmic plasmas has been achieved after studying the temporal evolution of the gas pressure in the vacuum vessel and the dependence of the repeatability of plasma discharges on different timing sequences between the gas puffing pulse and the onset of the ohmic field. The vacuum vessel of SUNIST was split into two insulated hemispheres, both of which were insulated from the central cylinder. The eddy currents flowing in the vacuum vessel (VV) were modeled and experimentally measured. A 3D finite elements model indicated that when the poloidal field (PF) was applied, the induced eddy currents on the top and bottom of vacuum vessel had the same direction as the current flowed in the PF coils. These features resulted in the leading phases of signals on the top and bottom flux loops when compared with the PF waveforms. A magnetic probes array based on flexible printed circuit boards was mounted on the surface of the VV to measure the eddy current flowing in the wall of VV. The measurements confirmed the modelling results. A prototype of a super-fast reciprocating (up to 20 m/s) probe has been developed for SUNIST and makes it possible to get the radial profile of electrostatic parameters of the short pulse (< 20 ms) ohmic plasmas in one shot. Besides the technical progress, some physical results, including toroidal Alfven eigenmodes (TAE) excited by runaway electrons and edge plasmas properties, will also be presented.

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