SUNIST United Laboratory and Improvement of Operation on SUNIST Spherical Tokamak

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SUNIST United Laboratory has been founded in 2004, consists of Department of Engineering Physics, Tsinghus University (DEP) ; Institute of Physics, Chinese Academy of Science (IOP) and keeping very close collaboration with Southwestern Institute of Physics (SWIP) and Institute of Plasma Physics, Chinese Academy of Science (IPPAS).

SUNIST spherical tokamak has been assembled in November 2002. The leak rate of cross seal was less than 2×10^{-7} Pa·m^3/s. Test discharge of SUNIST completed at the end of 2002. We got the plasma with ~ 50 kA of current in test discharge without flattop on plasma current. We modified the power supply of vertical field to eliminate the couple effect between ohmic and equilibrium field in 2003, then we obtained fine equilibrium plasma current on SUNIST with about 2 ms flattop which limited by lack of Volt second in sine discharge mode.

A series of experiments has been taken for edge plasma, parameters, fluctuation and turbulence before and after power supply modification. At the end of 2003, we tried to deposit siliconized film on vacuum vessel. After siliconization, plasma current flattop could extended to signal of loop flux had fell down to zero. But few shots later, discharge quality became very difficult to control and major disruption happened frequently, which never see before siliconization. Subsequent shots suggest that filling hydrogen by pressure feedback mode is the reason to trigger the phenomena. We are going to modify SUNIST for pulse filling mode and double swing of ohmic heat field and upgrade diagnostics.