Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Study on Stabilization of Plasma Vertical Position of Tokamak Plasma with Local Helical Coils in TOKASTAR-2[1] KOUHEI YASUDA, TAKAAKI FUJITA, ATSUSHI OKAMOTO, HIDEKI ARIMOTO, RYOHEI IKEDA, SORA KIMATA, KEITARO KADO, Graduate School of Engineering, Nagoya University — Elongated plasmas are suitable for the high beta values and high confinement in tokamaks, but suffer from vertical positional instabilities, leading to Vertical Displacement Event (VDE). Helical magnetic field is thought to provide improved positional stability TOKASTAR-2 is a tokamak-stellarator hybrid device with local helical coils The shape and arrangement of the local helical coils are simple. We found that the existing helical coils were effective on stabilization of the plasma horizontal position but not effective on the vertical position in plasma experiments. Thus, to improve the effects on the vertical positional stability, we plan to install new local helical coils. We designed the new coils using magnetic field line tracing calculation. The effective radial magnetic field generated by the helical coils acts as restoring force, which is expected to stabilize the plasma vertical position. The effective radial field can be obtained by using triangular coils on upper and lower sides of the plasma. The magnitude of the effective field depends on the shape and position of the coils. In the meeting, optimization of the new coils and influence of the installation and manufacturing error of the coils will also be presented.

[1]This work is performed with the support and under the auspices of the NIFS Collaboration Research program (NIFS17KLEP026).

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Date submitted: 02 Jul 2019 Electronic form version 1.4