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# MHD Phenomena and Disruption Characteristics in SST-1 Early Plasma

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Steady State Superconducting Tokamak (SST-1) is a medium size Tokamak (R/a=1.1/0.2, BT ˜1.5T to 3T, IP ˜ 102kA) in operation at the Institute for Plasma Research, India. SST-1 has been consistently producing plasma currents in excess of 100kA, with Plasma durations above 250ms and a central magnetic field of 1.5T in recent experimental campaigns of 2016. Investigation of experimental data measured using discrete in-vessel Poloidal and Toroidal Mirnov coils suggests the presence of MHD instabilities in SST-1 plasma. The Mirnov coil data have been analyzed using Fast Fourier Transform analysis, time resolved frequency analysis using wavelet spectrogram, Singular Value Decomposition (SVD) and Mirnov Phase Comparison method with an objective of investigating Magnetohydrodynamic phenomena in large aspect ratio (R/a > 5.5) plasma column such as formed in SST-1 plasmas. The analysis clearly explains the behavior of MHD instabilities observed (i.e. tearing mode with m/n=2/1), oscillation frequencies (in the range of ˜ 5-7 kHz), growth rate and the island width in SST-1 Plasma etc. Onsets of (minor, major) disruptions triggered by MHD instabilities have been correlated with other diagnostics such as Soft-X ray, ECE, Hα and Density etc. The observations have been cross compared with the theoretical calculations based on Rutherford nonlinear theory and are found to be in good agreement. These new and novel results specific to high aspect ratio tokamak plasmas would be useful to future devices.

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