Global Plasma Oscillation Regime and Its Suppression on TCV

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In the Tokamak à Configuration Variable (R/a = 0.88 m/ 0.24 m, $B_T < 1.54$ T), global plasma oscillations are found to exist in fully non-inductive plasmas featuring eITBs with strong ECRH/ECCD. This phenomenon is akin to the so-called Oscillatory, or O-regime, first observed in LHCD plasmas on Tore Supra. In TCV, the O-regime is linked to the evolution of the MHD modes in the reversed magnetic shear plasmas. It is demonstrated that the O-regime can be effectively suppressed by ECCD-induced local current density perturbation or by adding an Ohmic current perturbation. In these experiments MHD activity is modified through current density profile tailoring rather than local deposition within an island. The suppression of the O-regime usually leads to improved energy confinement, which is characterized by exceeding the Rebut-Lallia-Watkins scaling, to obtain H_{RLW} above 3.5. The detection of the MHD modes by various diagnostics (ECE, SXR, Mirnov coils etc) has aided in the correct identification of rational q-surfaces and in understanding their role in the evolution of the O-regime. The evolution of the safety factor during the O-regime has been studied by means of CQL3D/ASTRA simulations and will be presented.