EX/P1-17 · Experimental Study of the Stability of Alfvén Eigenmodes on JET.

D. Testa, Massahusetts Institute of Technology, Boston, USA
Contact: dtesta@jet.uk

Abstract: Over the last few years, experiments have been performed on JET to study the dependence of the AE stability limits on the plasma parameters in different operating scenarios. These measurements have been systematically compared with theoretical models, with the aim of providing accurate predictions for burning plasma experiments, such as ITER. The increase in the edge magnetic shear provides a significant stabilizing contribution for low-n AEs in plasmas characterized by a monotonic q-profile, in agreement with code predictions. Conversely, in plasmas characterized by a non-monotonic q-profile and an Internal Transport Barrier, we have observed for the first time multiple weakly damped modes in the Alfvén frequency range even in the presence of a high edge magnetic shear. The increase in core toroidal rotation and bulk plasma beta splits the n=1 TAE frequency spectrum, contributing to reduce the mode damping rate without fast ion drive. The dependence of the damping rate for n=1 TAEs on the normalized Larmor radius rhostar has been investigated: it was found that them damping rate does not depend on ρ^* up to $\rho^* < 3.5 \times 10^{-3}$, and then decreases at higher ρ^*.

EX/P1-18 · Study of Plasma Equilibrium during the AC Current Reversal Phase in STOR-M

C. Xiao, University of Saskatchewan, Saskatoon, Canada
Contact: xiaoc@sask.usask.ca

Abstract: Alternating current (AC) tokamak operation and equilibrium studies have been performed on the STOR-M tokamak. The recent experiments have achieved consistent smooth current reversal through the implementation of a hybrid digital-analog position controller and by careful density control. In order to study the plasma equilibrium during the current reversal phase with negligible rotational transform, a segmented limiter with four isolated conducting plates has been installed. The plates can be connected outside the vacuum vessel, which allows measurements of currents flowing between limiter plates. When the current reversal is smooth with zero dwell time, the hydrogen line emission level and electron density remain finite, indicating a finite particle confinement. The current from the top to the bottom limiter plate is also finite and its direction is consistent with that of the grad-B drift. The observation suggests that the limiter and other conducting structures surrounding the plasmas plays the role, during the current reversal phase of AC tokamak operation, to short out the charge separation arising from the grad-B drift and to maintain a finite particle confinement.

EX/P1-19 · Flow Shear Stabilization Experiments in the ZaP Flow Z-Pinch

U. Shumlak, University of Washington, Seattle, USA
Contact: shumlak@aa.washington.edu

Abstract: The stabilizing effect of an axial flow on the m = 1 kink instability in Z-pinches has been studied numerically with a linearized ideal MHD model to reveal that a sheared axial flow stabilizes the kink mode when the shear exceeds a threshold. The sheared flow stabilizing effect is investigated with the ZaP Flow Z-pinch experiment. An azimuthal array of surface mounted magnetic probes located at the midplane of the 50 cm plasma column measures the fluctuation levels of the azimuthal modes m = 1, 2, and 3. After pinch assembly a quiescent period is found where the mode activity is significantly reduced. Optical images from a fast framing camera and a ruby holographic interferometer indicate a stable, discrete pinch plasma during this time. Multichord Doppler shift measurements of a C-III line show a large, sheared flow during the quiescent period and low, uniform flow profiles during periods of high mode activity. The value of the velocity shear satisfies the theoretical threshold for stability during the quiescent period and does not satisfy the threshold during the high mode activity.