Enhanced Neoclassical Transport and Mode Damping Caused by Chaos Near an Asymmetric Separatrix

D.H.E. DUBIN, UCSD, YU.A. TSIDULKO, Budker Inst. — Plasma loss due to apparatus asymmetries is a ubiquitous phenomenon in magnetic plasma confinement. Recent experiments have investigated the loss rate when a central squeeze potential is applied to a magnetized plasma column, creating two trapped particle populations separated by a separatrix. These populations react differently to the asymmetries, leading to a collisional boundary layer at the separatrix. A loss rate scaling as $\sqrt{\nu/B}$ due to the boundary layer is expected theoretically, provided that the separatrix itself is axisymmetric. However, when the separatrix is asymmetric, particles become trapped and detrapped as they follow collisionless orbits. This can lead to a chaotic region around the separatrix, giving enhanced transport scaling as $\nu B^{-1}$. This effect also damps certain plasma modes. Predictions for damping of trapped particle diocotron modes will be compared to experiments.

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3A.A. Kabantsev, adjacent poster.