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Long-Lived Ribbon Structure in JET Tokamak as a Manifestation of a Force-Free Magneto-Current Island

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Magnetic and current structures arising due to resonant perturbations of an equilibrium current-carrying magnetic configuration are analyzed using the Hamiltonian formalism. Special attention is paid to axisymmetric tokamak and pinch configurations. It is shown that, due to the very different dependencies of the magnetic and current rotational transforms on the plasma pressure, the resonances (islands) of the magnetic field may not coincide with those of the current. The perturbed force-free equilibrium of a cylindrical pinch in which the field and current islands overlap is analyzed. The long-lived ribbon structures observed in the JET tokamak are explained as a manifestation of a force-free magneto-current island.

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