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Kinetic Equations for the description of Neoclassical Tearing Modes[1] SIMON ALLFREY, PAVEL POPOVICH, STEVE COWLEY, Center for Multi-Scale Plasma Dynamics, Department of Physics & Astronomy, UCLA, Box 951547, Los Angeles, CA 90095-1547 — Our ordering of the magnetic island width is determined by requiring that the time-scales for 'island-flattening' by parallel and perpendicular transport are of the same order, $\chi_\parallel/l_\parallel^2 \sim \chi_\perp/w^2$(narrow islands are washed away by perpendicular transport, while as island width increases the time for parallel transport to flatten pressure also increases). Assuming gyroBohm like perpendicular transport and classical parallel transport this requirement leads to a width scaling $w \sim \epsilon^{1/2}L$. Using $\epsilon^{1/2}$ as the small parameter, we expand the Fokker-Planck equation in the region of the island, $(\psi - \psi_0)/\psi$, applying the well known Chapman-Enskog method. This procedure yields 2-D equations for the evolution of the electron and ion distribution functions. These equations are solved subject to boundary conditions provided by matching to an external MHD solution. This model forms an appropriate basis for the consistent inclusion of micro-turbulence in the neoclassical tearing mode problem.

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