EXPANSIONS VALID NEAR A MAGNETIC AXIS FOR NON-SYMMETRIC TORIODAL

IDEAL MAGNETOHYDRODYNAMIC EQUILIBRIA

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In a paper to be published in Phys. Plasmas, “Ideal magnetohydrodynamic equilibrium in a non-symmetric topological torus” it was shown that it is possible to construct formal expansions to all orders in an expansion parameter for low shear equilibria without any singular currents and with smooth magnetic surfaces which fill out the domain. That analysis could easily be extended to a true toroidal domain, excluding a region near the magnetic axis. Complexities near the magnetic axis have already been identified in the work of A. Salat, Phys. Plasmas, 2,1652 (1995). This work uses the equilibrium representation developed in the paper to be published and expands the equilibrium relations near the magnetic axis. The ability to obtain formal expansions to all orders is explored for the distinct cases of surfaces weakly perturbed from toroidal circular cylinders and toroidal elliptical cylinders.