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Expansion of toroidal MHD equilibria about a given flux surface HAROLD WEITZNER, New York University — Earlier work, H. Weitzner, Phys. Plasmas 20, 022515 (2014) constructed formal expansions of toroidal ideal MHD equilibria, where the expansion parameter was the amplitude of the "helical" magnetic field components. The equilibrium was assumed to have low shear and the resonant components of the boundary flux surfaces were not free but were determined by other components of the magnetic fields and boundary flux surfaces. Here, we consider the topological torus $x>0$, $0<y<1$, $0<z<1$, and assume periodicity in y and in z. It is shown that one can give data on the flux surface $x=0$ and expand the equilibrium in powers of x–or an equivalent variable. The rotational transform on $x=0$ is rational, but otherwise free. The magnetic field on $x=0$ must satisfy the well-known condition that the integral of $1/B$ on every closed magnetic field line must take the same value. Again, convergence is not proven. However, analogies with, and differences from the classic Cauchy-Kowalewski theorem on the existence of analytic solutions of partial differential equations are discussed.

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