Free Boundary Magnetohydrodynamic Equilibria with Flow[1]

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Equilibria with flow are known to exhibit characteristics different from static equi-
libria. In particular, plasma rotation often reduces turbulent transport, as exhibited
by H-mode confinement state observed in tokamaks. The equations that govern
MHD equilibrium with flow are the generalized Grad-Shafranov equation and the
magnetic Bernoulli equation. The finite element, free boundary equilibrium solver in
the M3D code has been modified to included arbitrary toroidal and poloidal flows.
The M3D+FLOW code differs from other codes in that, being a free boundary
code, it includes the separatrix and the region outside the separatrix. Results for
M3D+FLOW are presented for both subsonic and transonic flows. Application to
data from the XGC gyrokinetic code is also presented.

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