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Magnetic flux coordinates for high-beta tokamak equilibria with flow[1] ATSUSHI ITO, NORIYOSHI NAKAJIMA, National Institute for Fusion Science — Magnetic flux coordinates are useful for the study of stability of toroidal plasmas. A set of the magnetic flux coordinates are constructed from an analytic solution for the reduced magnetohydrodynamic equilibrium equations for high-beta tokamaks in the presence of toroidal and poloidal flows comparable to the poloidal sound velocity. The set of magnetic flux coordinates are found by solving the algebraic equations for the relation between the cylindrical and magnetic flux coordinates that are obtained by extending those for the static equilibria. As an application, the pressure profile in the magnetic coordinates is examined. The poloidal profiles of the pressure on each constant radial coordinate show that the pressure maxima are located in the outer midplane for sub-sonic poloidal flow and in the inner midplane for super-sonic poloidal flow. The flux surface average of the pressure does not strongly depend on the poloidal flow velocity, but it is peaked near the magnetic axis for sub-sonic poloidal flow while it is broad for super-sonic poloidal flow, compared with that for the static equilibrium.

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