Sorting Category: 5.1.0 (Theoretical)

Issues in the Large-Aspect-Ratio Limit of Neoclassical Transport Theory[1] S.K. WONG, Mesa College, V.S. CHAN, GA — A number of issues are examined in the banna regime neoclassical transport for large-aspect-ratio flux surfaces of arbitrary shapes. The method of matched asymptotic expansions is used to obtain analytical solutions for plasma distribution functions and to compute transport coefficients, which are found to share a common geometry factor. The method provides justification for retaining only the part of Fokker-Planck operator that involves the second derivative in parallel velocity for the trapped and barely trapped particles. It leads to a simple equation for the freely circulating particles with boundary conditions that embody a discontinuity separating particles moving in opposite directions. Corrections to the transport coefficients are obtained using a boundary layer analysis according to Hinton and Rosenbluth.[2] The system of moment and field equations describing transport with shape change of flux surfaces is consistently taken in the cylinder limnit, which facilitates the discussion of consistency and the method of solution. Expressions are obtained for the poloidal variations of the electrostatic potential and plasma density.

[2]F.L. Hinton and M.N. Rosenbluth, Phys. Fluids **16**, 836 (1973).

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