

Self-consistent poloidal electric field and neoclassical angular momentum flux

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Abstract

A complete expression is obtained for the poloidal variation of the electrostatic potential in the banana regime for large aspect ratio flux surfaces using the method of matched asymptotic expansions. The result exhibits a finite discontinuity at the innermost point of a flux surface instead of a divergence as previously reported. Using this expression in combination with the solution of the linearized drift kinetic equation with a model collision operator, the part of the toroidal angular momentum flux due to the poloidal electric field is calculated. The result is larger than the one in existing works, which neglect the poloidal electric field, by the order of the square root of the aspect ratio.