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Connection formula for banana-drift neoclassical toroidal viscosity¹ A.J. COLE, C.C. HEGNA, J.D. CALLEN, University of Wisconsin — Non-resonant magnetic perturbations can affect plasma rotation in toroidally confined plasmas through their modification to $|B|$. Variations along a field line induce nonambipolar radial transport and produce a global neoclassical toroidal viscous force [NTV]. In this work, a previously calculated WKB-type solution smoothly connecting the low-collisionality “ $1/\nu$ ” and “ $\nu - \sqrt{\nu}$ ” regimes is extended to include the superbanana plateau [sbp] regime [1]. The sbp effect occurs for particles whose toroidal $\vec{E} \times \vec{B}$ precessional drift vanishes. In this case, the relevant drift kinetic equation exhibits a “turning point” and the WKB method fails. We employ the connection formula method of Langer [2] which continuously varies between the previous WKB result and the superbanana regime without difficulty at the turning point. The resultant smoothed NTV is presented in terms of flows along flux surfaces.

[1] K. C. Shaing, S. A. Sabbagh, and M. S. Chu, PPCF **51**, 035009 (2009), and refs. cited therein.

[2] R. E. Langer, Phys. Rev. **51**, 669 (1937).

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