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Extending the collisional fluid equations into the long mean-free-path regime in toroidal plasmas. IV. Banana Regime K. SHAING, Plasma and Space Science Center, National Cheng Kung University — In Part I [Phys. Fluids B **2**, 1190 (1990)] and Part II [Phys. Plasmas **12**, 082508 (2005)], it is emphasized that the equilibrium plasma viscous forces when applied for the magnetohydrodynamic (MHD) modes are only rigorously valid at the mode rational surface where $m - nq = 0$. Here m is the poloidal mode number, n is the toroidal mode number, and q is the safety factor. This important fact has been demonstrated explicitly by calculating the viscous forces in the plateau regime in Part I, and II. Here, the effective viscous forces in the banana regime are calculated for MHD modes by solving the linear drift kinetic equation that is driven by the plasma flows first derived in Part I. At the mode rational surface, the equilibrium plasma viscous forces are reproduced. However, it is found that away from the mode rational surface, the viscous forces for MHD modes decrease, a behavior similar to that observed in the viscous forces for the plateau regime. The proper form of the momentum equation that is appropriate for the modeling of the MHD modes is also discussed.

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