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Unaveraged parallel viscous force and its effects on shear flows and turbulence[1] A.L. GARCIA-PERCIANTE, C.C. HEGNA, P.W. TERRY, University of Wisconsin-Madison — Recent calculations have demonstrated that the varying part of $\mathbf{B} \cdot \nabla \cdot \mathbf{\Pi}_{\|}$ exceeds the averaged closure by a factor of $1/\epsilon$ in a large aspect ratio expansion. We investigate the effect of the large poloidally varying parallel viscosity on shear flow evolution and turbulence by extending a phase transition model developed by Diamond et. al. [Phys. Rev. Lett. 16, 2565]. In the modified model, averaged and poloidally varying parts of the shear flow are advanced separately. These two equations are coupled to each other through the viscous force $\mathbf{B} \cdot \nabla \cdot \mathbf{\Pi}_{\|}$ (which damps both $m = 0$, 1 components of the poloidal flow) and to the fluctuation level through the Reynolds stress tensor. The fluctuation levels for steady states are shown to be lower when the total viscous drive is taken into account and the transition from a no-flow state to a state with poloidal flow occurs faster. These results can be used to explore the implications of the anisotropic viscous damping of the poloidal flow on the L-H transition.

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