

Turbulent transport of poloidal momentum in toroidal plasmas

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In this article, we discuss the turbulent transport of the momentum (the component which is perpendicular to the main magnetic field) in toroidal plasmas. The fluctuations, in the quasi-linear response, tend to induce the shear of mean poloidal flow, as is the case of driving the zonal flows [1]. The case is studied, where the shear of mean poloidal flow and the mesoscale zonal flows coexist. The zonal flows, which have more rapid growth rate than the shear of mean flow, reaches the nonlinear saturation state, modifying the interaction of microscopic fluctuations and the shear of mean flow [2]. Taking into account of the screening effect of zonal flows, the shear of mean poloidal flow is subject to the diffusive damping. Response to the external force is studied. A new bifurcation (from the state where mesoscale zonal flows are dominating to the one where zonal flows are suppressed) is found.

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This work was partially supported by Grant-in-Aid for Specially-Promoted Research (16002005) of MEXT, Japan [Itoh project], by Grant-in-Aid for Scientific Research (19360418) of JSPS, and by the collaboration programmes of RIAM of Kyushu University, and of NIFS (NIFS07KOAP017, NIFS06KDAD005).