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Radial Spreading of Drift Wave-Zonal Flow Turbulence via Soliton Formation[1] ZEHUA GUO, LIU CHEN[2], Department of Physics and Astronomy, UC Irvine, CA 92697, U.S., FULVIO ZONCA, Associazione EURATOM-ENEA sulla Fusione, C.P. 65–00044 Frascati, Italy — Recently, it has been shown that turbulence spreading is responsible for the local turbulence intensity dependence on the global nonuniform equilibrium properties, *i.e.* the size scaling of turbulent transport coefficients. In the present work, first we investigate the slab model for the spatio-temporal evolution of the drift wave(DW) radial envelope and zonal flow(ZF) amplitude. Stationary solution of the coupled partial differential equations in a simple limit yields formation of DW-ZF solitons. It is shown that the DW-ZF soliton structures propagate at group velocity which depends on the envelope peak amplitude. Additional interesting physics, *e.g.* birth/death, collision, and reflection of solitons, as well as turbulence bursting can also be observed due to effects of linear growth/damping, dissipation, equilibrium nonuniformities and soliton dynamics. The propagation of soliton causes significant radial spreading of DW turbulence and therefore can affect transport scaling by increasing the turbulent region. Discussion on the correspondence to the two-field DW-ZF description in toroidal geometry will also be presented.

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[2]Also at IFTS, ZJU, China

Zehua Guo
Department of Physics and Astronomy, UC Irvine, CA 92697

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