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Generalized Weight-Based PIC Simulation Schemes for Tokamak Plasmas W.W. LEE, S. ETHIER, Princeton Plasma Physics Laboratory, R. GANESH, Institute for Plasma Reserach, India — A generalized weight-based particle simulation schemes suitable for simulating microturbulence in magnetic fusion plasmas, where the zeroth-order inhomogeneity is important, has recently been developed [1]. The schemes is a generalization of the perturbative simulation schemes developed earlier for PIC simulations [2]. The new two-weight scheme, which can simulate both the perturbed distribution (δf) and the full distribution (total-F) within the same code, has now been extended to simulate tokamak plasmas using the GTC code [3]. Its development is based on the concept of multiscale expansion, which separates the scale lengths of the background inhomogeneity from those associated with the perturbed distributions. In this paper, we will demonstrate the correctness and the usefulness of such a code, which starts out as a δf code and gradually evolves into a full-F code. The δf part would help us with the noise issue in the linear stage and the full-F part of the code could be useful when the particle weights become too large or it becomes necessary to simulate the realistic situation where the sinks and sources for the simulation become important. [1] W. W. Lee, T. G. Jenkins and S. Ethier, Comp. Phys. Comm. **182**, 564 (2011). [2] S. E. Parker and W. W. Lee, Phys. Fluids B **5**, 77 (1993). [3] Z. Lin, T. S. Hahm, W. W. Lee, W. M. Tang and R. White, Science **281**, 1835 (1998).

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