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Low dimensional gyrokinetic PIC simulation by δf method C.M. CHEN, YASUTARO NISHIMURA, C.Z. CHENG, Institute of Space and Plasma Sciences, National Cheng Kung University, Taiwan — A step by step development of our low dimensional gyrokinetic Particle-in-Cell (PIC) simulation is reported. One dimensional PIC simulation of Langmuir wave dynamics is benchmarked.[1] We then take temporal plasma echo as a test problem to incorporate the δf method. Electrostatic driftwave simulation in one dimensional slab geometry[2] is resumed in the presence of finite density gradients. By carefully diagnosing contour plots of the δf values in the phase space, we discuss the saturation mechanism of the driftwave instabilities. A $v_{\parallel}$ formulation is employed in our new electromagnetic gyrokinetic method by solving Helmholtz equation for time derivative of the vector potential.[3] This work is supported by Ministry of Science and Technology of Taiwan, MOST 103-2112-M-006-007 and MOST 104-2112-M-006-019.

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[2]S .E. Parker and W. W. Lee, Phys. Fluids B **5**, 77 (1993).
[3]H. Naitou (private communication, 2009); E. A. Starstev (private communication, 2014). Electron and ion momentum balance equations are employed in the time derivative of the Ampere's law.

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