

Abstract Submitted
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Proposal of a brand-new gyrokinetic algorithm for global MHD simulation¹ HIROSHI NAITOU, KENICHI KOBAYASHI, HIROKI HASHIMOTO, TAKEHISA ANDACHI, Yamaguchi U., WEI-LI LEE, PPPL, SHINJI TOKUDA, JAEA, MASATOSHI YAGI, Kyushu U. — A new algorithm for the gyrokinetic PIC code is proposed. The basic equations are energy conserving and composed of (1) the gyrokinetic Vlasov (GKV) equation, (2) the Vortex equation, and (3) the generalized Ohm's law along the magnetic field. Equation (2) is used to advance electrostatic potential in time. Equation (3) is used to advance longitudinal component of vector potential in time as well as estimating longitudinal induced electric field to accelerate charged particles. The particle information is used to estimate pressure terms in equation (3). The idea was obtained in the process of reviewing the split-weight-scheme formalism. This algorithm was incorporated in the Gpic-MHD code. Preliminary results for the $m=1/n=1$ internal kink mode simulation in the cylindrical geometry indicate good energy conservation, quite low noise due to particle discreteness, and applicability to larger spatial scale and higher beta regimes. The advantage of new Gpic-MHD is that the lower order moments of the GKV equation are estimated by the moment equation while the particle information is used to evaluate the second order moment.

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