Simulation of Finite-Beta Effects in Gyrokinetic Plasmas[1] ED-
WARD STARTSEV, WEI-LI LEE, Princeton Plasma Physics Laboratory — A gen-
eralization of the original split-weight scheme for finite-beta plasmas [W. W. Lee,
J. Lewandowski, Z. Lin and T. S. Hahm, Phys. Plasmas **8**, 4435 (2001)] to multi-
dimensional plasmas is developed. The scheme is based on the concept of pertur-
bative particle simulation, where only the non-adiabatic response of the electrons,
δh, is followed in time, where $\delta h = F - (1 + \psi)F_0$, F is the electron dunstibution
function, F_0 is the background electron distribution function, $\psi = \phi + \int A_\parallel dx_\parallel / c$,
and ϕ and $A_\parallel$ are the perturbed potentials. The procedure involves the Poisson
solvers for ϕ, $A_\parallel$, $\partial\phi/\partial t$, $\partial A_\parallel/\partial t$, and $\partial^2 A_\parallel/\partial t^2$, which, in turn, need up zeroth,
first, second and third velocity-space moments for input. The use of the scheme for
turbulence and MHD studies [Lee and Qin, Phys. Plasmas **10**, 3196 (2003)] will be
presented.

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