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Relaxation of weights in a δf code[1] ALLEN BOOZER, Columbia University — The weight of particle i in a δf particle following code obeys $dw_i/dt = \dot{W}(\vec{x}_i, \vec{p}_i)$. The phase space location of the particle is $(\vec{x}_i, \vec{p}_i)$, and $\dot{W}$ is given by derivatives of a background Maxwellian. The weights w_i tend to increase without limit. When the w_i become sufficiently large the approximations used in δf codes become invalid. The long-term increase in w_i is unphysical since a particle should loose its history within a collision time. The addition of a term to the weight evolution equation solves the problem, $dw_i/dt = \dot{W} - \nu_w w_i$. If the constant ν_w is chosen to be comparable to, or smaller than, the collision frequency it should have no effect on physically correct outputs of the code, but should keeps the weights at a low amplitude forever. In order to conserve particles, the background Maxwellian must be modified so its density obeys $dn(\psi)/dt = \nu_w n \sum_i w_i f_i / \sum_i f_i$, where the sum is over an annular radial region. Similar changes in flow and temperature of the background Maxwellian are required to conserve momentum, and energy.

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