Abstract Submitted
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**Guiding Center Codes of High Accuracy**[1] ROSCOE WHITE, Princeton University — Guiding center simulations are an important means of predicting the effect of resistive and ideal magnetohydrodynamic instabilities on particle distributions in toroidal magnetically confined thermonuclear fusion research devices. Because saturated instabilities typically have amplitudes of $\delta B/B$ of a few times $10^{-4}$ numerical accuracy is of concern in discovering the effect of mode particle resonances. We develop a means of following guiding center orbits which is greatly superior to the methods currently in use. In the presence of ripple or time dependent magnetic perturbations both energy and canonical momentum are conserved in a time step to better than one part in $10^{14}$, an improvement of nine orders of magnitude, and the relation between changes in canonical momentum and energy is also conserved to very high order.

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