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Integration of Full Particle Orbit in Toroidal Plasmas Using Boris Scheme XISHUO WEI, YONG XIAO, Zhejiang Univ — When studying particle dynamics in high frequency electromagnetic waves, such as low hybrid wave heating, it is important to integrate full particle orbit accurately to very long time in tokamaks. Here we derived a formulation under magnetic coordinate based on the Boris Scheme, which can be used effectively to push particles in long time scale. After several hundred gyro-periods, the banana orbit can be observed and the toroidal precession frequency can be measured. The toroidal precession frequency is found to match that from the guiding center simulation. This new method shows superior numeric properties than the traditional Runge-Kutta method in terms of conserving particle energy and magnetic moment.

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