Multi-step Boris integrator for Lorentz-force equation

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The Buneman-Boris scheme solves the Coulomb-Lorentz force equation by separating it into the acceleration by the Coulomb (electric) force and the rotation by the Lorentz (magnetic) force. The Boris integrator (push) is widely used for solving the Lorentz force equation with the second-order accuracy via two-step computation of the cross product between a velocity vector and a magnetic field vector. However, the Boris integrator itself has a larger numerical error in its gyration angle for a larger time step. The purpose of this study is to decrease the numerical error of the Boris integrator by increasing the number of steps.