

OpenMP Parallelization of Three-Dimensional Magnetohydrodynamic Code FOI-PERFECT

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Abstract : Due to its complex spatial structure as well as dynamic temporal evolution, an analytic solution of an X-pinch process is out of question, and numerical simulation becomes an important tool in X-pinch studies. Intrinsically, simulations of X-pinch are three-dimensional (3D) because of the specific structure of its load. Furthermore, in order to resolve both its μm -scales and ns-durations, fine spatial mesh grid and short time steps are usually adopted. The resulting large computational scales make the parallelization of codes a vital problem to be solved if any practical simulations are to be carried out. In this work, we report OpenMP parallelization of our 3D magnetohydrodynamic (MHD) code FOI-PERFECT. Results of test runs confirm that computational efficiency has been improved after parallelization, and both the sequential and parallel versions give the same physical results under the same initial conditions.

Keywords : MHD simulation, OpenMP, parallelization, X-pinch

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