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Compression of Magnetohydrodynamic Simulation Data Using Singular Value Decomposition S.P. HIRSHMAN, D. DEL-CASTILLO-NEGRETE, D.A. SPONG, E.F. D'AZEVEDO, Oak Ridge National Laboratory — Numerical calculations of magnetic and flow fields in magnetohydrodynamic (MHD) simulations can result in extensive data sets. Particle-based calculations in these MHD fields, needed to provide closure relations for the MHD equations, will require communication of this data to multiple processors and rapid interpolation at numerous particle orbit positions. To facilitate this analysis it is advantageous to compress the data using Singular Value Decomposition (SVD, or Principal Orthogonal Decomposition, POD) methods. As an example of the compression technique, SVD is applied to magnetic field data arising from a dynamic nonlinear MHD code. The performance of the SVD compression algorithm is analyzed by calculating Poincaré plots for electron orbits in a three-dimensional magnetic field and comparing the results with uncompressed data.

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