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	abstract		abstract	Numerical methods for solving the ideal magnetohydrodynamic (MHD) equations in more than one space dimension must confront the challenge of controlling errors in the discrete divergence of the magnetic field. One approach that has been shown successful in stabilizing MHD calculations are constrained transport (CT) schemes. CT schemes can be viewed as predictor-corrector methods for updating the magnetic field, where a magnetic field value is first predicted by a method that does not exactly preserve the divergence-free condition on the magnetic field, followed by a correction step that aims to control these divergence errors. In Helzel et al. (2011) the authors presented an unstaggered constrained transport method for the MHD equations on 3D Cartesian grids. In this work we generalize the method of Helzel et al. (2011) in three important ways: (1) we remove the need for operator splitting by switching to an appropriate method of lines discretization and coupling this with a non-conservative finite volume method for the magnetic vector potential equation, (2) we increase the spatial and temporal order of accuracy of the entire method to third order, and (3) we develop the method so that it is applicable on both Cartesian and logically rectangular mapped grids. The evolution equation for the magnetic vector potential is solved using a non-conservative finite volume method. The curl of the magnetic potential is computed via a third-order accurate discrete operator that is derived from appropriate application of the divergence theorem and subsequent numerical quadrature on element faces. Special artificial resistivity limiters are used to control unphysical oscillations in the magnetic potential and field components across shocks. Test computations are shown that confirm third order accuracy for smooth test problems and high-resolution for test problems with shock waves.			
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