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ALGEBRAIC FLUX CORRECTION ALGORITHMS IN CONTINUOUS GALERKING DISCRETIZATION OF MAGNETOHYDRODYNAMICS EQUATIONS

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We consider a linearity preserving nodal variational limiting strategy for the stabilization of magnetohydrodynamics (MHD) systems. The MHD equations, with some divergence cleaning, are discretized using piece-wise linear continuous finite elements. The stabilization of the scheme follows the flux corrected transport paradigm by introducing some diffusion into the system, whose amount is regulated by solution dependent element and nodal limiters. The limiter is designed to be linearity preserving so to ensure that in smooth regions, second order convergence is observed for smooth solutions. The limiters are also designed such that they continuously dependent on data, guaranteeing solvability of the semi-discrete scheme. The limiting strategy allows for flexible assembly, and utilization of various time steppers. We consider a number of standard inviscid MHD and resistive MHD examples in 1D, 2D and 3D on unstructured quad/hex and simplex meshes. We also demonstrate the robustness of the scheme using various implicit and explicit time integrators.

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