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Energy Stable Space-Time Discontinuous Galerkin Approximations of the 2-Fluid Plasma Equations[1] JAMES ROSSMANITH, University of Wisconsin - Madison, TIM BARTH, NASA Ames — Energy stable variants of the space-time discontinuous Galerkin (DG) finite element method are developed that approximate the ideal two-fluid plasma equations. Using standard symmetrization techniques, the two-fluid plasma equations are symmeterized via convex entropy function and the introduction of entropy variables. Using these entropy variables, the source term coupling in the two-fluid plasma equations is shown to have iso-energetic properties so that the source term neither creates nor removes energy from the system. Finite-dimensional approximation spaces utilizing entropy variables are utilized in the DG discretization yielding provable nonlinear stability and exact preservation of this iso-energetic source term property. Numerical results for the two-fluid approximation of magnetic reconnection are presented verifying and assessing properties of the present method.

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