cases	doc_1	doc_2	decision	id
	authors: Downes, Turlough; O\u27Sullivan, Stephen **title**: An Explicit Scheme for Multifluid Magnetohydrodynamics **publication_date**: 2006-01-01 00:00:00 **source**: SupportedSources.CORE **journal**: **volume**: **doi**: None **urls**: https://core.ac.uk/download/301312394.pdf **id**: id-4372164028258632477 **abstract**: When modelling astrophysical fluid flows, it is often appropriate to discard the canonical magnetohydrodynamic approximation, thereby freeing the magnetic field to diffuse with respect to the bulk velocity field. As a consequence, however, the induction equation can become problematic to solve via standard explicit techniques. In particular, the Hall diffusion term admits fast-moving whistler waves which can impose a vanishing time-step limit.Within an explicit differencing framework, a multifluid scheme for weakly ionized plasmas is presented which relies upon a new approach to integrating the induction equation efficiently. The first component of this approach is a relatively unknown method of accelerating the integration of parabolic systems by enforcing stability over large compound time-steps rather than over each of the constituent substeps. This method, Super Time-Stepping, proves to be very effective in applying a part of the Hall term up to a known critical value. The excess of the Hall term above this critical value is then included via a new scheme for pure Hall diffusion **versions**:	**authors**: Stephen O'Sullivan; Turlough P. Downes **title**: An explicit scheme for multifluid magnetohydrodynamics **publication_date**: 2005-11-16 14:18:44+00:00 **source**: SupportedSources.ARXIV **journal**: Mon.Not.Roy.Astron.Soc.366:1329-1336,2006 **volume**: **doi**: 10.1111/j.1365-2966.2005.09898.x **urls**: http://arxiv.org/pdf/astro-ph/0511478v3; http://dx.doi.org/10.1111/j.1365-2966.2005.09898.x; http://arxiv.org/abs/astro-ph/0511478v3; http://arxiv.org/pdf/astro-ph/0511478v3 **id**: id-3793703646682670713 **abstract**: When modeling astrophysical fluid flows, it is often appropriate to discard the canonical magnetohydrodynamic approximation thereby freeing the magnetic field to diffuse with respect to the bulk velocity field. As a consequence, however, the induction equation can become problematic to solve via standard explicit techniques. In particular, the Hall diffusion term admits fast-moving whistler waves which can impose a vanishing timestep limit. Within an explicit differencing framework, a multifluid scheme for weakly ionised plasmas is presented which relies upon a new approach to integrating the induction equation efficiently. The first component of this approach is a relatively unknown method of accelerating the integration of parabolic systems by enforcing stability over large compound timesteps rather than over each of the constituent substeps. This method, Super Time Stepping, proves to be very effective in applying a part of the Hall term up to a known critical value. The excess of the Hall term above this critical value is then included via a new scheme for pure Hall diffusion. **versions**:	DUPLICATES	1118