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cases	**authors**: Derigs, D.; Gassner, G.; Walch, S.; Winters, A. **title**: Entropy Stable Finite Volume Approximations for Ideal Magnetohydrodynamics **publication_date**: 2018-03-13 00:00:00 **source**: SupportedSources.CROSSREF **journal**: **volume**: **doi**: 10.1365/s13291-018-0178-9 **urls**: http://link.springer.com/article/10.1365/s13291-018-0178-9/fulltext.html; http://link.springer.com/content/pdf/10.1365/s13291-018-0178-9.pdf; http://link.springer.com/content/pdf/10.1365/s13291-018-0178-9.pdf; http://dx.doi.org/10.1365/s13291-018-0178-9 **id**: id2879413635803059965 **abstract**: **versions**:	**authors**: Dominik Derigs; Gregor J. Gassner; Stefanie Walch; Andrew R. Winters **title**: Entropy Stable Finite Volume Approximations for Ideal Magnetohydrodynamics **publication_date**: 2017-08-11 13:32:45+00:00 **source**: SupportedSources.ARXIV **journal**: None **volume**: **doi**: **urls**: http://arxiv.org/pdf/1708.03537v1; http://arxiv.org/abs/1708.03537v1; http://arxiv.org/pdf/1708.03537v1 **id**: id-4384609911721657406 **abstract**: This article serves as a summary outlining the mathematical entropy analysis of the ideal magnetohydrodynamic (MHD) equations. We select the ideal MHD equations as they are particularly useful for mathematically modeling a wide variety of magnetized fluids. In order to be self-contained we first motivate the physical properties of a magnetic fluid and how it should behave under the laws of thermodynamics. Next, we introduce a mathematical model built from hyperbolic partial differential equations (PDEs) that translate physical laws into mathematical equations. After an overview of the continuous analysis, we thoroughly describe the derivation of a numerical approximation of the ideal MHD system that remains consistent to the continuous thermodynamic principles. The derivation of the method and the theorems contained within serve as the bulk of the review article. We demonstrate that the derived numerical approximation retains the correct entropic properties of the continuous model and show its applicability to a variety of standard numerical test cases for MHD schemes. We close with our conclusions and a brief discussion on future work in the area of entropy consistent numerical methods and the modeling of plasmas. **versions**:	DUPLICATES	1029