Contribution ID: **35** Type: **Contributed talk**

Variational discretizations of ideal magnetohydrodynamics in smooth regime using finite element exterior calculus

Friday, 5 April 2024 12:00 (30 minutes)

We propose a new class of finite element approximations to ideal compressible magnetohydrodynamics equations in smooth regime. Our discretizations are built via a discrete variational principle mimicking the continuous Euler-Poincaré principle, with vector fields represented by their action as Lie derivatives on differential forms, to further exploit the geometrical structure of the problem. The resulting semi-discrete approximations are shown to conserve the total mass, entropy and energy of the solutions. In addition the divergence-free nature of the magnetic field is preserved in a pointwise sense, and the scheme is reversible at the fully discrete level. Numerical simulations are conducted to verify the accuracy of our approach and its ability to preserve the semi-discrete invariants for several test problems. An eponym paper will be uploaded to arxiv in the coming days.

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