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*Structure Preserving Discretizations for Magnetohydrodynamics*

In this talk, we consider different models for magnetohydrodynamics (MHD) that incorporate linear (resistive MHD) or nonlinear (Hall MHD) Ohm's laws. We discuss finite difference and finite element methods for these models that preserve at the discrete level important continuum properties, such as the divergence free nature of magnetic and velocity fields. These are important structure preserving properties required in MHD simulations to avoid spurious or non-physical numerical solutions. We discuss recent computational techniques for MHD kinematics as well as full MHD simulations in two spatial dimensions that are based on the framework of the Virtual Element Method which is a generalization of the finite element method to general polygonal and polyhedral meshes.