**An O(N) solver for non-ideal Magnetohydrodynamics (MHD) based on a non-iterative IMEX method using successive convolution.**

Andrew Christlieb- Michigan State University

In this talk we formulate consternated transport in terms of a Vector potential for the non-ideal form of MHD. The resulting form of the Vector potential resembles a Hamilton Jacobi equation. This equation contains the stiff terms that can mitigate the size of the time step. To allow for a CFL of 1 with these stiff source terms, we introduce successive convolution to solve the resulting Vector potential. The successive convolution approach is O(N), unconditionally stable and lets us robustly solve for the Vector potential without the need to artificial limiters as in our past work. The non-field terms of MHD are updated using finite difference WENO. The method has been developed for mapped grids. In the talk, we review the successive convolution, and show how it lets us achieve a CFL of 1 with stiff terms.