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Hybridizable Discontinuous Galerkin Numerical Methods and their Applicability to Plasma Simulation Codes[1] ANDREW HO, University of Washington, URI SHUMLAK, University of Wahington, IMAN DATTA, University of Washington — Hybridizable Discontinuous Galerkin (HDG) is a relatively new and novel approach for discretizing advection-diffusion-reaction problems. Key advantages of this method is that it is capable of obtaining optimal convergence rates, exhibits good numerical conditioning for implicit/algebraic solvers, and is amenable to a highly efficient generalization of static condensation for reducing the system size of the global implicit solve. The method has been demonstrated to be effective at handling a wide variety of traditional linear and non-linear PDE problems, including the incompressible resistive MHD system. This research investigates the applicability of HDG methods for handling the 5N-moment multifluid plasma model, mixed potential formulations for Maxwell's equations, and the effectiveness of coupling HDG with Additive Runge-Kutta (ARK) Implicit-Explicit (ImEx) temporal solvers for plasma systems.

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