An Overview of the Moving Discontinuous Galerkin Method with Interface Condition Enforcement (MDG-ICE)

Dr. Andrew Corrigan

US Naval Research Laboratory

Friday, April 3, 2026, 3:30pm

PH 122

Abstract: The Moving Discontinuous Galerkin with Interface Condition Enforcement (MDG-ICE) method is an implicit shock-fitting method that detects, tracks, and fits all shocks and material interfaces as well as fine-scale features such as boundary layers and reaction zones by treating the mesh as a variable within an optimization framework. Unsteady problems are cast into a space-time formulation to accommodate material interface-shock interactions with non-trivial and dynamic topology. We assess its ability to detect, fit, and track shock waves and sharp features and demonstrate high-order accuracy even in the presence of discontinuous interfaces, overcoming a longstanding challenge associated with traditional methods. We discuss future work required to ensure its robustness, scalability, and efficiency.