

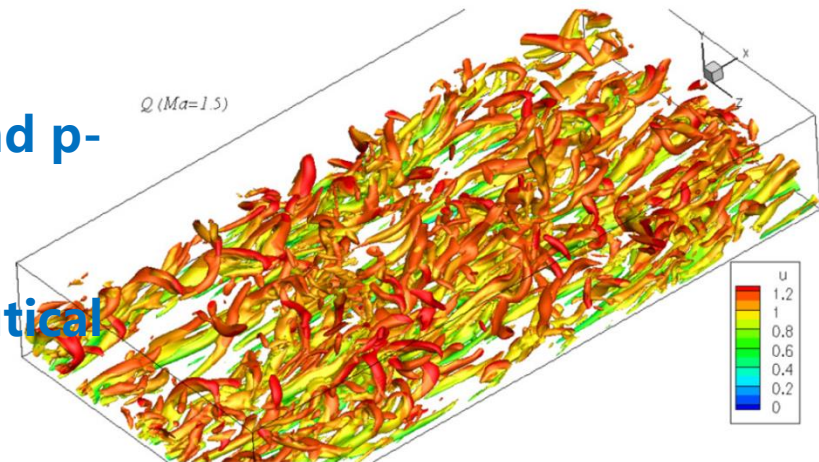
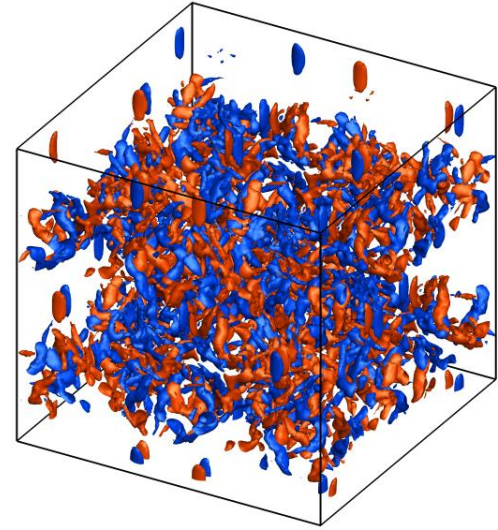
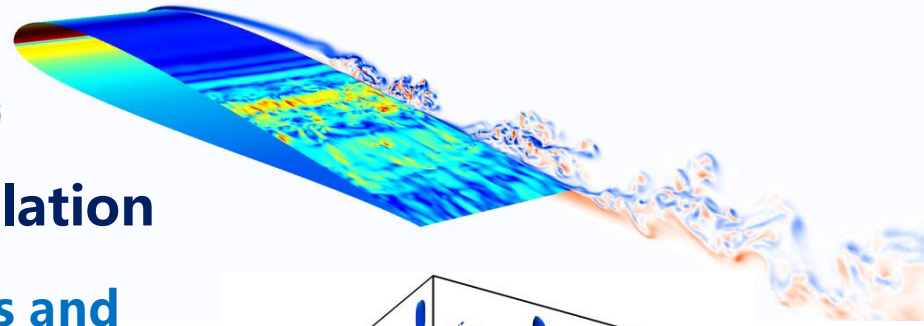
What Is The Problem

□ Compressible Turbulence Simulation

- ✓ **Features:** small scale fluctuations and discontinuities like shocks
- ✓ **Difficulty:** suppress spurious oscillations without smearing fluctuations

□ Discontinuous Galerkin Method

- ✓ High order accuracy for unstructured meshes on complex configurations
- ✓ Feasibility for adaptivity: both h- and p-type
- ✓ High fidelity simulation for aeronautical and astronomical problems



What Have I Done

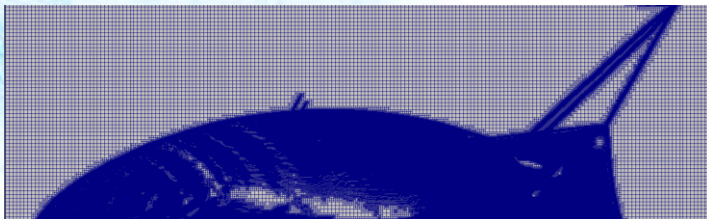
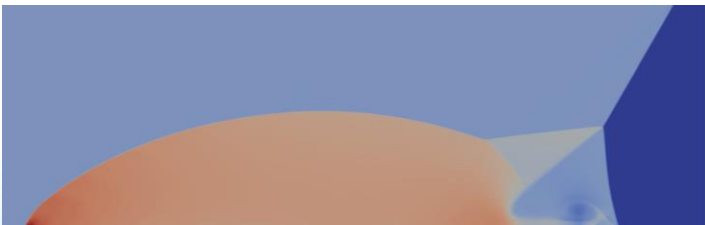
- Taken and modified an implementation of deal.II by C. Praveen

- ✓ **Features:** DG, 2-D Euler equations, limiters, h-adaptivity, etc.

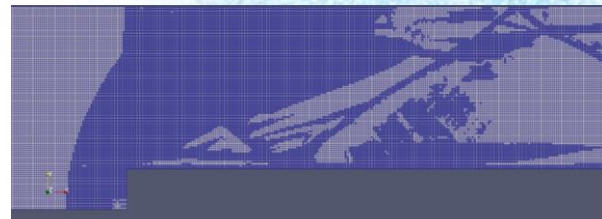
- Test cases

- ✓ **2D inviscid compressible flows with strong shocks**

Double Mach Reflection



Forward Step Flow



What Do I Need & Future Work

- **Extend to 3D Navier-Stokes equations**
- **Develop new methods for shock capturing without as little numerical dissipation as possible**
- **Generate 3D meshes with complex configurations**
 - ✓ **High order boundary representation**
- **Incorporate standard functionality into deal.II**
 - ✓ **Operators of DG for 1st order derivative term (Euler equation)**
 - ✓ **Operators of DG for 2nd order derivative term (NS equation)**
 - ✓ **Complementary functionality such as averaging flowfields**
 - ✓ **etc.**