OperaFOAM (Overset) Enhancements and Verification and Validation

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In this talk, I will provide an overview of recent developments to our in-house overset code - Overset Parallel Engine for Aerodynamics Applications (OPERA). OPERA is a stand-alone parallel overset grid library [1] that computes the overlap connectivity between multiple meshes and provides an interface to external flow solvers such as OpenFOAM [1]-[2] and SU2 [3]. Some of the recent enhancements include

1. Choice of overlap priority between meshes: Users can now switch between volume based overlap and edge based overlap strategy. Cells with smaller edges can take priority over the other cells that overlap at the same location.

2. Implicit fringes option: Users can turn off implicit fringe determination on near-body grids. This ensures, the complete near-body mesh is preserved and avoids interpolation near wall boundaries under certain circumstances.

3. Improved hole cutting: Initial version of OPERA failed to perform hole cutting correctly when there are multiple bodies on a single mesh. Using a minor modification to the flood-fill algorithm, hole cutting can be achieved accurately.

Also included will be verification and validation cases using OperaFOAM with the overset computations in StarCCM+ and ANSYS Fluent. Demonstration of the compressible version of OperaFOAM using standard test cases will be provided.

References

