

Case Study # 2: OpenFOAM–Lid-Driven Cavity Flow

Background:

The flow of an incompressible fluid induced in a square cavity by a moving upper boundary, "lid-driven" cavity flow, is a classic validation case for Computational Fluid Dynamics (CFD) solvers. This case study requires that you perform numerical simulations of this flow problem for various flow regimes using an Open Source PDE solver: OpenFOAM. In the process of completing this Case Study, you will install OpenFOAM on your computer, learn to set-up, run, and post-process a flow simulation by completing the first tutorial described in [OpenFOAM's User Guide](#), and compare your predictions to relevant published results.

Tasks:

- Install OpenFoam (www.openfoam.org)
- Complete the [lid-driven cavity flow tutorial](#) up to and including 2.1.8.
- Qualitatively compare your results to those published in the literature (e.g. [1] or [2])

Report:

Prepare a report (2-4 pages max in [ASME's two-column article format](#), templates are available [on-line](#)) describing your work and including:

1. Short description of the flow problem
2. Solver Setup
 - A description of the setup that you have selected to install OpenFOAM on your system.
 - A summary of the difficulties that you have encountered in the installation and setup process and how you have addressed them.
3. Numerical Solution
 - Selected key results (mesh sensitivity, laminar/turbulent cases)
 - Summary of the difficulties that you have encountered in the running the various cases and how you have addressed them.
4. Discussion and Conclusions: A short, qualitative comparison of your results to those published in the literature (e.g. [1] or [2]).

The Report (single file, PDF format only) is due on **November 2, 2014 at 5pm** and must be submitted electronically using the class [SmartSite](#).

References

- [1] U Ghia, K. N Ghia, and C. T Shin. *Journal of Computational Physics*, 48(3):387–411, 12 1982.
- [2] Charles-Henri Bruneau and Mazen Saad. *Computers & Fluids*, 35(3):326–348, 3 2006.