COMPUTATIONAL FLUID MECHANICS (M2794.009200)

Prerequisites: Numerical Analysis in Mechanical Engineering (M2794.009000)

Text

Computational Methods for Fluid Dynamics by Ferziger & Peric (or Ferziger, Peric & Street), Springer, 3rd (or 4th) Ed.

References

Fundamentals of Engineering Numerical Analysis by Moin, Cambridge University Press.
Computational Techniques for Fluid Dynamics by Fletcher, Springer-Verlag.
Numerical Heat Transfer and Fluid Flow by Patankar, McGraw Hill.
Spectral Methods in Fluid Mechanics by Canuto, Hussaini, Quarteroni & Zang, Springer.

Topics
1) Basic concept of fluid flow
2) Introduction to numerical methods
3) Finite difference methods
4) Finite volume methods
5) Solution of linear equation systems
6) Method for unsteady problems
7) Solution of Navier-Stokes equations
8) Complex geometries (including Immersed boundary method)
9) Turbulent flows
10) Compressible flow
11) Efficiency and accuracy improvement
12) Some special topics

Homework and Project

Approximately three to four homework and one term project will be given.
1 Do not present your source code.
2 Present results in graphical form whenever possible. When it is appropriate to include raw data (usually never!) or listings, place them in appendices.
3 State any conclusions reached; comment on unusual or unexpected behavior. Discuss the significance and limitation of results.

Grade: Term Project (50%), Homework (40%), Attendance (10 %)

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