

Fluid Mechanics - Video course

- **Fundamental Concepts of Fluid Flow:** Fundamental definitions, Flow characteristics, Classification of fluids, Fluid properties, Foundations of flow analysis.
- **Fluid Statics:** Fluid pressure, Forces on solid surfaces, Buoyant forces.
- **Kinematics of Fluid Flow:** Equations for acceleration, Continuity equation, Irrotational and rotational flow, Potential and stream functions.
- **Dynamics of Fluid Flow:** Finite control volume analysis, Euler and Bernoulli's theorems, Impulse momentum theory, Applications of energy and momentum equations
- **Laminar and Turbulent Flows:** Types of flow, Reynolds experiment, Laminar flow between parallel plates, Laminar flow in pipes, Turbulent flow in pipes.
- **Pipe Flow Systems:** Darcy-Weisbach equation, Moody diagram, Energy losses in pipelines, Minor losses, Multiple pipe systems.
- **Dimensional Analysis:** Model similitude, Model scales, Theory and applications.
- **Navier- Stokes Equations and Applications:** Introduction to Navier- Stokes equations, Exact solutions for simple cases of flow, Plane Poiseuille flow, Couette flow, Stokes flow and porous media flow.
- **Boundary Layer Theory and Applications:** Concepts of boundary layer, Flow separation, Circulation, Drag and lift on immersed bodies.

Texts/ References:

Granger, R.A., *Fluid Mechanics*, CBS College Publishing, New York, 1985.
 Douglas, J.F., Gasiorek, J.M., Swaffield, J.A., *Fluid Mechanics*, Addison-Wesley, Harlow 1999.
 Streeter, V.L., Wylie, E. Benjamin, *Fluid Mechanics*, McGraw-Hill, London, 1998.
 Shames, I.H., *Mechanics of Fluids*, McGraw Hill, New York, 1992.
 Daugherty, R.L., Franzini, J.B., Finnemore, E.J. *Fluid Mechanics with Engineering Applications*, McGraw Hill, New York, 1985.
 Jain, A.K., *Fluid Mechanics*, Khanna Publishers, New Delhi, 1998.
 Modi, L.P.N., Seth, S.M., *Hydraulics and Fluid Mechanics*, Standard Book House, New Delhi, 2002.



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