

Machinery Vibration Incorporated provides Engineering Services to a broad range of industries. We supply Practical Engineering Solutions to improve performance and boost production.

Machinery Vibration Inc. (MVI) is a small group of engineering specialists focused on troubleshooting rotating machinery, fluid delivery systems, and mechanical component failures.

A valuable off-shoot of this troubleshooting work is MVI's **on-site short courses** that incorporate MVI's highly successful troubleshooting methods, experience and numerous case studies.

SHORT COURSE

Computational Fluid Dynamics

COURSE CONTENT

Introduction

What is CFD? Why CFD? Advantages and disadvantages of CFD?

Governing Equations & Boundary Conditions

Conduction; Convection; Navier-Stokes

Discretization Methods

Finite Difference; Finite Element; Finite Volume

Solution of System of Algebraic Equations

Direct Solvers; Iterative Solvers; Jacobi; Gauss Seidel; SOR

Time Marching Techniques

Euler: Explicit; Crank-Nicholson: Semi-Implicit; Euler: Implicit

Convection-Diffusion Problems: Discretization of Convective Terms

Central Differencing; Upwind Differencing; Hybrid Method

Navier Stokes Equation: The Pressure Term

Staggered Grid; SIMPLE Method

Nuances of Numerical Simulations

Natural Convection and Driven Cavity Benchmarks; Effect of Grid Resolution; Effect of Numerical Diffusion; Effect of Boundary Conditions; Effect of Material Properties; Effect of Source Terms

Case Studies

Crystal Growth from Vapor
 Fiber Growth by Chemical Vapor Deposition
 Crystal Growth from Melt
 Modeling of Space Multizone Furnaces
 Modeling of Sapphire Fiber-Pulling Furnace
 Bubble Dynamics in Space
 Oscillatory Flow in Silicon Wafer Growth System
 Two Phase Flow in Space-Based Cryogenic Storage Tanks
 Fluid Structural Interactions in Human Heart
 Gravitational Fluid Dynamics of the Inner Ear

MVI's short course, Computational Fluid Dynamics, helps engineers answer questions such as:

- When should I solve CFD problems in-house vs. using a contractor?
- What minimal set of information do I need?
- When is it worthwhile to get field test data to calibrate the model?
- What is the economic impact of doing a good modeling job?
- Where can I find appropriate software that can be used at the plant level at a low cost?
- How do I know when I have reasonable results?
- What kind of service should I get from a contractor?

MVi

Based in Cleveland, Ohio, the core of MVI's technical staff includes **Dr. Maurice L. Adams, Jr.** and **Dr. Michael L. Adams.**

Contact MVI via email at: mla5@mvibe.com

For more information on our other services and courses, please visit our website at:

www.mvibe.com

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