

Abstract Submitted
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Introducing CFD in Introductory Undergraduate Fluid Mechanics Courses JOHN M. CIMBALA, Penn State University — Many instructors want to introduce CFD into their introductory junior-level fluid mechanics course, but cannot because it requires several hours of class time at the cost of displacement of other basic material. A simple but effective method is now available that has been used successfully at Penn State since Spring 2005. It requires minimal instructor preparation time and only about one class period. Namely, immediately after solving the Navier-Stokes equation analytically for simple flows such as Couette and Poiseuille flow, CFD is introduced as a modern tool for solving the same equations numerically. The application of CFD (grid generation, boundary conditions, etc.), rather than numerical algorithms, is stressed. Homework problems are then assigned using pre-defined templates for FlowLab, a student-friendly analysis and visualization package created by Fluent, Inc. The templates and exercises are designed to support and emphasize the theory and concepts taught in class and in the textbook. For example, the new textbook by Cengel and Cimbala (McGraw-Hill 2006) contains 46 end-of-chapter homework problems that are used in conjunction with 42 FlowLab templates. Each exercise has been designed with two major learning objectives in mind: (1) enhance student understanding of a specific fluid mechanics concept, and (2) introduce the student to a specific capability and/or limitation of CFD through hands-on practice.

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