

Abstract Submitted
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Online Simulator of a Cylinder Wake for Undergraduate Fluid Mechanics Labs ADAMS KRAMER, BRYAN LEWIS, Brigham Young University Idaho — Wind tunnels are commonly used in undergraduate fluid mechanics courses to help students understand fluid flow around objects, particularly wake dynamics. Large engineering and physics programs may only have one wind tunnel accessible to undergraduate students, limiting their experience to only a few minutes each. While many recent advances have been made in virtual reality (VR) fluids labs, VR systems are costly, require high computational resources, and can only be accessed by students in a dedicated computer lab. The goal of this project was to develop an online simulator of a wind tunnel which students could access at any time. A simulation of the wake behind a circular cylinder was developed, with the local velocity being measured by a virtual pitot-static probe. The probe can be moved to any location downstream of the cylinder, allowing students to extract span-wise and axial velocity profiles. The simulated local velocity is calculated from the Schlichting self-similar wake profile, with a small random perturbation that is a function of the Struhaul-Reynolds number correlation. The simulator was calibrated using actual wind tunnel measurements. A controlled educational study of the impact on students using the simulator is being planned.

Adams Kramer
Brigham Young University Idaho

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