

Abstract Submitted
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Design of a High Viscosity Couette Flow Facility for Patterned Surface Drag Measurements¹ TYLER JOHNSON, AMY LANG, University of Alabama — Direct drag measurements can be difficult to obtain with low viscosity fluids such as air or water. In this facility, mineral oil is used as the working fluid to increase the shear stress across the surface of experimental models. A mounted conveyor creates a flow within a plexiglass tank. The experimental model of a flat or patterned surface is suspended above a moving belt. Within the gap between the model and moving belt a Couette flow with a linear velocity profile is created. PIV measurements are used to determine the exact velocities and the Reynolds numbers for each experiment. The model is suspended by bars that connect to the pillow block housing of each bearing. Drag is measured by a force gauge connected to linear roller bearings that slide along steel rods. The patterned surfaces, initially consisting of 2-D cavities, are embedded in a plexiglass plate so as to keep the total surface area constant for each experiment. First, the drag across a flat plate is measured and compared to theoretical values for laminar Couette flow. The drag for patterned surfaces is then measured and compared to a flat plate.

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Amy Lang
University of Alabama

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