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Characterization of friction drag over biofilms and rigid analogs ELIZABETH CALLISON, JOEL HARTENBERGER, JAMES GOSE, University of Michigan, MARC PERLIN, Texas A&M University, STEVEN CECCIO, University of Michigan — Soft biofilms can form at flow boundaries, producing increased friction drag which can adversely affect the performance of hydrodynamic systems. The underlying mechanisms of drag production in soft biofilms are not well understood. Surface roughness, compliance, and the presence of streamers within the boundary layer flow can all contribute to the development of friction drag by turbulent boundary layers. To examine the drag producing flow, flat plates covered in biofilms were studied in the Skin-Friction Flow Facility at the University of Michigan. Experiments evaluating the drag produced by the live biofilm were then compared to those of solid, three-dimensional printed, rigid replicas to differentiate the measured drag forces and their components. These rigid replicas were generated via additive manufacturing using in situ measurements of the biofilm surface profile collected at several flow speeds and growth incubation times. The hydrodynamic performance of the biofilms was determined through pressure drop measurements as well as planar particle image velocimetry of the channel flow. Comparisons of the resistance curves for the rigid replicas and live biofilm will be discussed and flow measurements will be presented.

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