

Abstract Submitted
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Characterization of Mechanical Properties of Microbial Biofilms

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Univ of Michigan - Ann Arbor — The physical properties of microbial biofilms grown subject to shear flows determine the form and mechanical characteristics of the biofilm structure, and consequently, the turbulent interactions over and through the biofilm. These biofilms – sometimes referred to as slime – are comprised of microbial cells and extracellular polymeric substance (EPS) matrices that surround the multicellular communities. Some of the EPSs take the form of streamers that tend to oscillate in flows, causing increased turbulent mixing and drag. As the presence of EPS governs the compliance and overall stability of the filamentous streamers, investigation of the mechanical properties of biofilms may also inform efforts to understand hydrodynamic performance of fouled systems. In this study, a mixture of four diatom genera was grown under turbulent shear flow on test panels. The mechanical properties and hydrodynamic performance of the biofilm were investigated using rheology and turbulent flow studies in the Skin-Friction Flow Facility at the University of Michigan. The diatoms in the mixture of algae were identified, and the elastic and viscous moduli were determined from small-amplitude oscillations, while a creep test was used to evaluate the biofilm compliance.

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