Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Dynamics of a Flexible Fiber Suspended in High Density Foam Under Shear[1] JACOB SEBASTIAN, MUSTAFA USTA, CYRUS AIDUN, Georgia Inst of Tech — Behavior of flexible fiber suspended in high density (HD) foam is of great interest in many applications. In this study, we explore the behavior and dynamics of a single fiber suspended in HD foam in simple shear flow. Rheological behavior of the HD foam varies as a function of foam density and strain rate. Experiments show that an increase in foam density leads to a decrease in shear stress. Hershel-Bulkley (HB) constitutive model provides an accurate phenomenological model to characterize the behavior of the HD foam. Fiber suspended in the HD foam is modeled as a chain of cylindrical segments interacting with the HB fluid. Linear and angular momentum equations are solved for each of the fiber segments. Thus, the evolution of the motion and orientation of the fiber is derived. HD foam flow is characterized by Reynolds number, Hedstrom number, power law index and slip velocity. Similarly, the flexible fiber is characterized by bending ratio, fiber aspect ratio and fiber volume fraction. The flow of HB fluid under shear and the dynamics of a single fiber in shear flow will be presented.

[1]This work used the Extreme Science and Engineering Discovery Environment (XSEDE), which is supported by National Science Foundation grant number ACI-1548562. Research is supported by the Paper Science Engineering (PSE) fellowship from Renewable Bioproducts Institute (RBI).

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Date submitted: 09 Aug 2020 Electronic form version 1.4