Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Improving Pressure Simulations Driven by Immersed Dynamic Surfaces MARIN LAUBER, GABRIEL WEYMOUTH, University of Southampton — Immersed boundary methods are extensively used for fluid-structure interaction problems involving large and complex deformations of the body such as a flapping fishtail, or a boats sail during tacking. When the body is thin and drives the flow, as in these examples, correctly capturing the unsteady pressure forces is extremely important. However, very few immersed boundary methods correctly impose the no-slip condition, leading to substantial errors in those forces. Part of the issue in the no-slip steams from the treatment of the pressure flux at the immersed boundary. We discuss the technical challenges in enforcing the correct pressure flux treatment on the immersed boundary and develop a simple 1D FSI system to illustrate these issues explicitly. We develop a method for quickly and accurately simulating pressure driven by immersed dynamic surfaces and present results for unsteady 2D and 3D test cases related to insect flight.

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Date submitted: 10 Aug 2020 Electronic form version 1.4