

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Numerical simulation of fluid-structure interaction of turbulent boundary layer with an elastic plate¹ SREEVATSA ANANTHARAMU, KRISHNAN MAHESH, University of Minnesota - Twin Cities — Understanding the influence of turbulent boundary layer wall-pressure fluctuations on elastic structures is essential to understand the acoustic radiation to far-field due to their vibration. A parallel unsteady structural solver is being developed to solve linear/nonlinear elasticity problems using Finite Element Method. Several wall-pressure cross-spectral density models have been proposed in literature for turbulent boundary layers. A methodology will be discussed to synthetically generate space-time wall-pressure fluctuations given its cross-spectral density. The cross-spectral density of plate displacement from Poisson-Kirchhoff theory will be compared to the results obtained numerically using the synthetically generated pressure fluctuations. Pressure fluctuations from a DNS of turbulent channel flow will then be used to excite the plate. Unsteady stresses inside the plate and the resulting deformation will be discussed.

¹Supported by NSWCCD

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Date submitted: 28 Jul 2017

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