

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Sound radiated by the interaction of non-homogeneous turbulence on a transversely sheared flow with leading and trailing edges of semi-infinite flat plate¹ MOHAMMED AFSAR, University of Strathclyde, VASILIS SASSANIS, Mississippi State University — The small amplitude unsteady motion on a transversely sheared mean flow is determined by two arbitrary convected quantities with a particular choice of gauge in which the Fourier transform of the pressure is linearly-related to a scalar potential whose integral solution can be written in terms of one of these convected quantities. This formulation becomes very useful for studying Rapid-distortion theory problems involving solid surface interaction. Recent work by Goldstein et al. (JFM, 2017) has shown that the convected quantities are related to the turbulence by exact conservation laws, which allow the upstream boundary conditions for interaction of a turbulent shear flow with a solid-surface (for example) to be derived self-consistently with appropriate asymptotic separation of scales. This result requires the imposition of causality on an intermediate variable within the conservation laws that represents the local particle displacement. In this talk, we use the model derived in Goldstein et al. for trailing edge noise and compare it to leading edge noise on a semi-infinite flat plate positioned parallel to the level curves of the mean flow. Since the latter represents the leading order solution for the aerofoil interaction problem, these results are expected to be generic.

¹M.Z.A. would also like to thank Strathclyde University for financial support from the Chancellors Fellowship.

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Date submitted: 01 Aug 2017

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