

## ACOUSTICS2008/3170 The Mechanisms of Roughness Noise

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The interaction of turbulence and a rough surface results in the radiation of sound that is not produced in smooth wall flows. The mechanisms by which this sound is generated are not well understood. Scattering of the convected turbulent pressure field by the surface irregularities seems to be a probable source when the roughness size is small compared to the boundary layer. The bluff body mechanisms of vortex shedding and unsteady drag from the roughness elements appear more likely to be dominant sources when those elements are large compared to the boundary layer. Demonstrating the existence of these mechanisms, their range of dominance, the extent to which they are distinct and can be characterized in terms of flow parameters that can be realistically modeled (such as the surface pressure spectrum), are all pre-requisites to the development of a robust prediction method. New insight into these issues has been obtained through measurements made with using a purpose built roughness noise facility in combination with fundamental theoretical analysis of the problem. The measurements include roughness noise spectra, wall pressure spectra and aerodynamics for a large variety of rough surfaces. This work is supported by the Office of Naval Research.