Simulation of Aeroacoustic Noise from a Shinkansen Train

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Abstract

To achieve more increases in the speeds of high-speed trains, reduction of aerodynamic noise is required. The train car gap is one of the major noise sources of high-speed trains. In our previous wind tunnel test we found that peak noise and broadband noise were generated by a car-gap. In order to investigate the mechanism of aerodynamic noise generation from a car gap, we performed numerical simulation of unsteady flow. We use Direct Numerical Simulation (DNS) to investigate the noise generation mechanism of the peak noise, and we clarify the condition of peak noise occurrence. On the other hand, we analyze the broadband noise by using Large Eddy Simulation (LES) and acoustics simulation, and we investigate the noise generation mechanism of high frequency broadband noise that is generated by the deformation of small eddy at the downstream edge.

Keywords : Aerodynamic Noise, Shinkansen, DNS, LES, Cavity, Turbulent Noise