Simulation of Aeroacoustic Noise from a Shinkansen train

Project Representative

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In order to investigate the mechanism of aerodynamic noise generation from a car gap of Shinkansen trains, we performed numerical simulation of unsteady flow around a car gap by using Large Eddy Simulation (LES). We succeeded to elucidate the noise generation mechanism and to predict the sound pressure spectrum quantitatively by the calculation of 150 million grids which can resolve the structures of streaks in turbulent boundary layers.

Numerical simulation of unsteady flow provide us the information of unsteady flow in 3 dimensional space and detailed locations of noise sources, which was difficult to capture by experimental measurement. This study shows the availability of Computational Aeroacoustics for turbulent flow by using LES not only for simplified element model but also for complicated model of industrial design such as Shinkansen train cars.

Key Words : Aerodynamic Noise, Shinkansen, Car gap, Turbulent Boundary Layer, LES