

Low Frequency Aerodynamic Sound from Shinkansen Trains

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Pressure fluctuation is generated by the high-speed trains and the railway structures in an open section without tunnels. This pressure fluctuation consists of two components, i.e. the aerodynamic component which is generated by the train vehicles and the structure borne sound generated by the railway structures, and the frequency of interest is mainly below 100Hz. In particular, for the aerodynamic component, the characteristics, e.g. noise sources and frequency spectra, are unclear while major aerodynamic sources of Shinkansen noise in the range of 100 to 20kHz are pantographs, bogies and gaps between cars. In this study, a field test using a linear microphone array was conducted in order to make clear the low-frequency aerodynamic sound sources. In addition, a model-scale experiment using a launching facility for train model was carried out to simulate the actual aerodynamic sound and investigate low-noise shapes. Through these tests, the bogie cavities under the train body are identified as one of the major sources. It is also found out that the rounding the cavity edge is supposed to be one of the effective reduction countermeasures against the low-frequency aerodynamic sound.