عنوان مقاله:

Aerodynamic Noise Simulation of a High-Speed Maglev Train Operating inside a Fully Enclosed Sound Barrier

محل انتشار:

تعداد صفحات اصل مقاله: 15

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خلاصه مقاله:

The aerodynamic noise from the new high-speed Maglev train (NHMT) is significant. One way to reduce it is to use a fully enclosed sound barrier (FESB). This paper studies the aerodynamic noise characteristics of the NHMT operating inside a FESB at ۶۰۰ km/h, taking into account the compressibility of air and the quadrupole sound sources. The transient flow field around the NHMT is simulated by adopting an improved delayed detached-eddy simulation. According to Lighthill acoustic analogy theory, the aerodynamic noise inside and outside the FESB can be simulated using the acoustic finite element method. The sound insertion loss (IL) of the FESB is analyzed by comparing the noise outside the FESB with the noise generated by the NHMT operating on open tracks. The results indicate that the noise is distributed in the streamlined shoulder area of the head and tail car and the wake. The far-field noise belongs to broadband noise, and the noise outside the FESB is similar to an incoherent line source. The IL of the FESB is ۲۵.۲ dB(A) at ۲۵ m from the track centerline and ۳.۵ m above the track surface. Therefore, the noise reduction effect of a FESB is much better than a traditional upright sound barrier.

کلمات کلیدی:

High-speed Maglev train, Aerodynamic noise, Fully enclosed sound barrier, acoustic finite element method, Insertion loss

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