

**EDITORIAL****Introduction to the Special Issue on Passive and Active Noise Control for Vehicle****Hui Guo^{*} and Chao Yang**

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The new generation of road vehicles is undergoing rapid advancements towards electrification, intelligence, inter-connection and sharing. Besides being a means of transportation, vehicles are expected to have more functions, such as work and entertainment. In line with these trends, vehicle interior noise control deserves renewed attention beyond traditional approaches such as just controlling physical acoustic quantities. The last decade has witnessed revolutionary progress in materials, structures, control methods and technologies that create a quieter and more comfortable interior sound environment for vehicles. However, prevalent challenges remain, notably the intense time-varying and nonlinear characteristics of interior noise generated in the running vehicle, especially under high-speed driving conditions. Additionally, the advent of differentiated functional zones within future vehicle cabins, such as dedicated working or entertainment spaces, will likely introduce novel challenges for interior noise and sound quality control.

The special issue titled “Passive and Active Noise Control for Vehicles” aspires to furnish readers with seminal theoretical insights and engineering breakthroughs in vehicle noise control. Novelty, high quality, and importance are the cornerstones of the special issue.

Following a rigorous peer review process, six illuminating articles have been selected for inclusion in this definitive collection. These articles present the current state of research initiatives and developments in passive and active noise control.

The first paper “Research on narrowband line spectrum noise control method based on nearest neighbor filter and BP neural network feedback mechanism” by Zhang et al. [1] introduced a novel coefficient updating method for the FxLMS algorithm based on the filter structure of nearest neighbor regression and neural network feedback mechanism, named NNR-BPFxLMS algorithm, to improve active noise control algorithms.

The second paper “Loss factors and their effect on resonance peaks in mechanical systems” written by Vinokur [2] reviewed mechanical loss factors, which control the magnitudes and frequencies of resonance peaks in vibration and acoustical phenomena. The author analyzed complex moduli of elasticity and total loss factors, which are helpful for engineers and students, especially those working in the fields of NVH analysis and testing, mechanical and aeromechanical design, and noise and vibration control in buildings.

In the third paper entitled “Research on Human-Vehicle-Road Friendliness Based on Improved SH-GH-ADD Control”, Bao et al. [3] intended to develop an improved Sky-Ground Hook and Acceleration-Driven damper control strategy aiming to control the sprung mass and unsprung mass over the full frequency band for semi-active suspension systems.



In the fourth paper entitled “Multi-objective prediction and optimization of vehicle acoustic package based on ResNet neural network”, combined with the multi-level objective decomposition and the ResNet neural network model, Wu et al. [4] proposed a method to alleviate the inherent limitations of traditional SEA simulation design and enhances the prediction performance.

In the fifth paper entitled “Adaptive multi-feature fusion for vehicle micro-motor noise recognition considering auditory perception”, Zhao et al. [5] proposed a novel approach based on the VAF-CNN. The multi-sensor network, adaptive weighting, feature fusion and data enhancement are adopted in the research. The experimental results show that the method holds notable practical significance.

In the sixth paper entitled “A sound quality evaluation method for vehicle interior noise based on auditory loudness model”, He et al. [6] established a human ear physiological model and a deep neural network for the sound quality evaluation of vehicle. The tests show that the proposed method can simulate the human subjective perception.

Finally, we hope the special issue disseminates new ideas and inspires future researchers to make important discoveries.

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