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SPEED DISTRIBUTION INFLUENCE IN ROAD TRAFFIC NOISE PREDICTION

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Abstract

In road traffic noise issues, experimental measurements are a relevant element in order to understand the problem and to adjust models. Sometimes, when measurements are not possible or in the designing phase, prediction models are used to perform an estimation of the equivalent level produced by a road infrastructure. Usually models parameters are obtained by a statistical data fit and thus they are related to the area where measurements have been performed. These models are suitable for standard conditions, but they generally fail when vehicle speed distribution influence cannot be neglected, such as non-free flow traffic, traffic jams, etc.. Thus, the possibility to perform a road traffic noise prediction by means of energy based stochastic approach represents a challenge in the noise control issues. The equivalent level, in fact, depends on the acoustical energy emitted by each vehicle, which may be directly connected to its speed by some experimental relations. In this paper, the authors present a new approach in which the speed of each vehicle is randomly generated according to specific speed distributions. The different distributions are chosen according to the contextual traffic situation (free flow, pulsed accelerated flow, intersection, mixed flow composition, etc.), resulting in a detailed microscopic description of the phenomenon, based on a stochastic core model. Once the speed is generated according to the given distribution, the global level is obtained collecting all the energies sent to the receiver by each source. The results of this procedure are compared with experimental measurements.

Key words: noise annoyance, numerical acoustic model, road traffic noise, sound level

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