Modeling speed and width parameters of vehicle tires for prediction of the reduction in vehicle noise pollution

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Abstract

Introduction: Safe driving requires the ability of the driver to receive the messages and complying with them. The most significant consequences of noise pollution are on the human auditory system. Disorders in the auditory system can have harmful side effects for human health. By reducing this kind of pollution in large cities, the quality of life, which is one of the biggest goals of the governments, can be considerably increased. Hence, in the present research, some parameters of vehicle tires were examined as a source of noise pollution, and the results can be taken into consideration in noise pollution reduction.

Material and Method: Several vehicles with different tire width were selected for measuring sound level. The sound levels were measured for moving vehicles with the use of the Statistical Pass By Method (SPB, ISO 11819-1). Following sound level measurements for moving vehicles and by considering tire width, mathematical model of noise level was predicted on the basis of the obtained information and by usage of SPSS program and considering vehicle tire parameters.

Result: The result of this study showed that the vehicle speed and tire width can affect different sound levels emitted by moving tire on road surface. The average speed of vehicles can play an important role in the noise pollution. By increasing speed, rotation of the the tires on the asphalt is increased, as it is a known factors for noise pollution. Moreover, changing the speed of vehicles is accompanied with abnormal sounds of vehicle engine. According to regression model analysis, the obtained value of R2 for the model is 0.8367 which represents the coefficient of determination.

Conclusion: The results suggest the main role of the vehicle speed and tire width in increasing the noise reaches to the drivers and consequent noise pollution, which demonstrates the necessity for noise control measures. According to the obtained model, it is understood that changes in noise levels and tire width are more than those of vehicles speed. The coefficient of 0.1482 for tire width, comparing to coefficient of 0.1195, shows that considering the proper tire width can be effecttive in reduction of sound level.

Keywords: *Tire Width, Speed, Noise Level, Vehicle, Hearing*

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