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Title: Statistical classification of road pavements using near field vehicle rolling noise measurements

Source: JOURNAL OF THE ACOUSTICAL SOCIETY OF AMERICA, 128 (4): 1747-1754 Part 1 OCT 2010

Language: English

Document Type: Article

KeyWords Plus: ACOUSTICAL CHARACTERIZATION; PROPAGATION; SOUND

Abstract: Low noise surfaces have been increasingly considered as a viable and cost-effective alternative to acoustical barriers. However, road planners and administrators frequently lack information on the correlation between the type of road surface and the resulting noise emission profile. To address this problem, a method to identify and classify different types of road pavements was developed, whereby near field road noise is analyzed using statistical learning methods. The vehicle rolling sound signal near the tires and close to the road surface was acquired by two microphones in a special arrangement which implements the Close-Proximity method. A set of features, characterizing the properties of the road pavement, was extracted from the corresponding sound profiles. A feature selection method was used to automatically select those that are most relevant in predicting the type of pavement, while reducing the computational cost. A set of different types of road pavement segments were tested and the performance of the classifier was evaluated. Results of pavement classification performed during a road journey are presented on a map, together with geographical data. This procedure leads to a considerable improvement in the quality of road pavement noise data, thereby increasing the accuracy of road traffic noise prediction models. (C) 2010 Acoustical Society of America. [DOI: 10.1121/1.3466870]

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Publisher: ACOUSTICAL SOC AMER AMER INST PHYSICS

Publisher Address: STE 1 NO 1, 2 HUNTINGTON QUADRANGLE, MELVILLE, NY 11747-4502 USA

ISSN: 0001-4966

DOI: 10.1121/1.3466870

29-char Source Abbrev.: J ACOUST SOC AMER

ISI Document Delivery No.: 669FA