The Effects of Varying the Tire Cap Ply, Sidewall Filler Height and Pavement Surface Texture on Tire/Pavement Noise Generation

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16. Abstract

In order to better understand the effect of tire carcass construction and pavement texture on tire/pavement noise generation, a measurement program was conducted on a group of four automobile tires on three pavement textures. The tires included all combinations of cap ply, no cap ply, sidewall filler height of 1.75 inches and sidewall filler height of 0.35 inches. The tires, General AmeriG4S, P205/65R15, were nominally identical in all other respects including tread pattern and rubber compound properties. During this investigation, other tire design variables such as tire pressure and rim size were held constant. The pavement samples were made of rigid Portland Cement Concrete (PCC) pavement sections with smooth, textured and porous surface textures. Tests were conducted at speeds of 10, 20 and 30 mph.

The Tire/Pavement Test Apparatus (TPTA) at the Ray W. Herrick Laboratories at Purdue University was used for the tests. Five microphones were used to measure the sound generated by the tire/pavement interaction. Three microphones were located according to the specifications of the Close Proximity Method (ISO/CD 11819-2). The other two microphones were located such that one was in front of the tire 5 cm from the leading edge of the contact patch and one was behind the tire 5 cm from the trailing edge of the contact patch, along the centerline of the tire.

The tires all produce similar overall sound pressure level and frequency spectra for a specific test surface. The three pavements produced significantly different spectra. The porous pavement produced higher levels below 1000 Hz but lower levels than the other two pavement types above 1000 Hz. The pavement surface textures investigated had a much more significant effect on sound generation and radiation of the tires than the variations investigated for cap ply and sidewall filler height.

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