# Tire Cavity Resonance Mitigation using Acoustic Absorbent Materials

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**ABSTRACT**

In this study, the use of acoustic absorbent materials specifically felt to mitigate tire cavity resonance noise is presented. The inclusion of a trim in the tire cavity is represented by the addition of the acoustic damping loss factor into the sound pressure response function. In addition, the possible solution of using multilayer trim materials to mitigate the cavity mode effect is presented using the sound absorption coefficient values from the impedance tube experiments and by adopting other empirical models. Moreover, the sound absorption coefficient calculated from the method of electrical-analogy is compared with that from the experimental data and found to be reasonable. Experimental modal analysis was performed to show the effect of inserting an absorbent material (polyfelt) onto the inside surface of the tire where reduction in both the inside cavity sound pressure level and the wheel hub acceleration was observed. A Taguchi analysis is also done to rank the effectiveness of varying trim thickness and mass density as well as adding air gap to suppress tire cavity resonance noise.

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