

A Study of Tyre Cavity Resonance and Noise Reduction using Inner Trim

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ABSTRACT

A study of tyre inner trim as a method for reducing tyre cavity resonance noise is presented. The tyre is modelled as a rectangular toroid where only the outside shell is flexible. A modal series solution of the sound pressure frequency response inside the tyre cavity is derived from the wave equation using modal superposition. In the solution with the rigid and flexible wall boundary condition, the effect of placing a trim layer onto the inner surface of the tyre tread plate wall is reflected by adding a damping loss term in the sound pressure frequency response function. The numerical simulation result was then compared with the result obtained from a roving impact test performed on a tyre. The results show that selective trim material may be effective for reducing the structure-borne noise magnitude resulting from the tyre cavity resonance.

KEYWORDS: Tyre cavity; Resonance; Trim

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