

Modeling of a Vehicle Wheel System having a Built-in Suspension Structure Consisted of Radially Deployed Colloidal Spokes between Hub and Rim

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Abstract : In this work, by replacing the traditional solid spokes with colloidal spokes, a vehicle wheel with a built-in suspension structure is proposed. Following the background and description of the wheel system, firstly, a vibration model of the wheel equipped with colloidal spokes is proposed, and based on such model the equivalent damping coefficients and spring constants are identified. Then, a modified model of a quarter-vehicle moving on a rough pavement is proposed in order to estimate the transmissibility of vibration from the road roughness to vehicle body. In the end, the optimal design of the colloidal spokes and the optimum number of colloidal spokes are decided in order to minimize the transmissibility of vibration, i.e., to maximize the ride comfort of the vehicle.

Keywords : built-in suspension, colloidal spoke, intrinsic spring, vibration analysis, wheel

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