

Numerical Simulation and Experimental Validation of the Tire-Road Separation in Quarter-car Model

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Abstract : The paper investigates vibration dynamics of tire-road separation for a quarter-car model; this separation model is developed to be close to the real situation considering the tire is able to separate from the ground plane. A set of piecewise linear mathematical models is developed and matches the in-contact and no-contact states to be considered as mother models for further investigations. The bound dynamics are numerically simulated in the time response and phase portraits. The separation analysis may determine which values of suspension parameters can delay and avoid the no-contact phenomenon, which results in improving ride comfort and eliminating the potentially dangerous oscillation. Finally, model verification is carried out in the MSC-ADAMS environment.

Keywords : quarter-car vibrations, tire-road separation, separation analysis, separation dynamics, ride comfort, ADAMS validation

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