

عنوان مقاله:

Modelling and Test Verification of Suspension Optimal Damping Ratio for Electric Vehicles Considering Occupant-cushion and In-wheel Motor Effects

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خلاصه مقاله:

The damping ratio of chassis suspension is a key parameter for damping matching of in-wheel motor vehicles (IWMVs). Because the motor is attached to the driving wheel, the initial design method of the damping ratio for traditional cars is not entirely suitable for IWMVs. This paper proposes an innovative initial design method of the damping ratio for IWMVs. Firstly, a traveling vibration model of occupant-vehicle-road (OVR) for IWMVs is established. The model involves the occupant, cushion, suspension, in-wheel motor, road, and running speed. Secondly, on the basis of the model, using a special form of infinite integral, a mathematical expression of the occupant root-mean-square (RMS) acceleration is derived. Thirdly, based on the RMS optimization criterion for ride comfort, an 8 order polynomial equation about the suspension optimal damping ratio is deduced. Subsequently, through factors analysis, the change principles of the optimal damping ratio versus vehicle parameters are unveiled. Finally, the reliability of the optimal damping ratio is validated by test. The relative deviation of the calculated optimal damping ratio and the tested damping ratio is 5.4%. The results show that the proposed optimal damping ratio can effectively guide the suspension damping matching for IWMVs.

کلمات کلیدی:

,Vehicle, In-wheel Motor, Test Verification, Damping Ratio

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