

Predicting the Vehicle Performance at an Early Stage of Development Process via Suspension Bushing Design Tool

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Abstract

This paper describes a method for verifying vehicle performance when applying a new suspension bushing at the concept phase of vehicle development. At the concept phase, it is difficult to obtain the nonlinear characteristics of the bushing, which plays an important role in the performance of the vehicle. Thus, a tool to design bushing has been developed.

The vehicle performance is verified at the concept stage by using the results of the developed bushing design tool and a Modelica system model. Designers can make various bushing characteristics in an intuitive and easy way using the bushing design tool. First, designers use original model's test data as an input of bushing design tool and determine the number of cells for the bushing model. The bushing design tool proceeds with the parameter identification through an optimization process based on the input test data and the number of cells of the model. The designers then determine the new bushing characteristics to get the desired static and dynamic characteristics in the original characteristics. The bushing design tool calculates the parameters of the bushing model according to the bushing characteristics changed to the result value. From simulation results, the vehicle performance is changed according to the characteristics of the suspension bushing. The designers can confirm the vehicle performance at the concept stage if the bushing, determined by the designers, is applied.

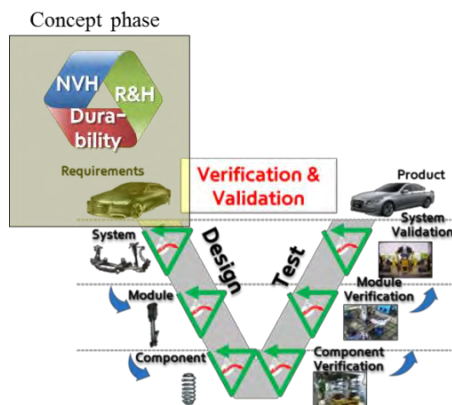


Figure 1. Vehicle development cycle and concept phase.

The developed bushing design tool allows designers to evaluate vehicle performance by reflecting bushing characteristics without actual products.

Keywords: suspension bushing, bushing design, vehicle dynamics, parameter identification.

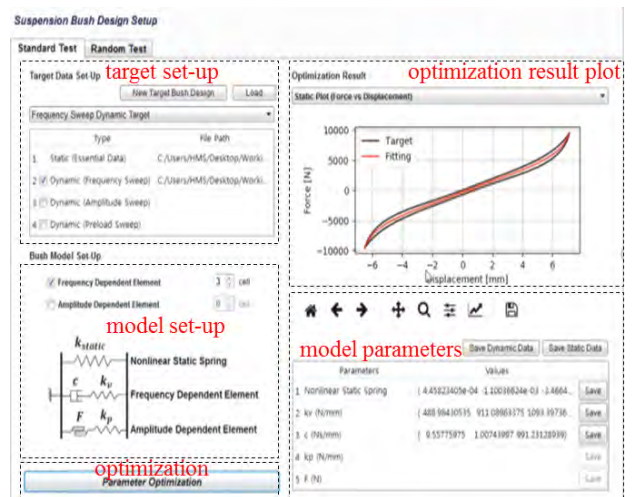


Figure 2. Interface of suspension bushing design tool.

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