Sensitivity parametric analysis of UMTRI static roll model

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Abstract

This paper presents the results of a sensitivity parametric study of the static roll model which was recently developed by the University of Michigan Transportation Research Institute. The model and its computer program is developed for the purpose of determining the rollover threshold of articulated vehicles during a steady-state turning manoeuvre. This model requires a considerable amount of vehicle input data, some of which can be obtained only by using special expensive apparatus. Although the model represents a simplification of the actual vehicle system, the acquisition of its appropriate input data can be quite involved. It therefore seems useful to conduct an evaluation of the significance of certain input parameters to the simulation results. The measured design parameters of a nine-axle tractor-semitrailer are used in this study. In addition to demonstrating the influence of the vehicle design parameters on the static roll behaviour, some of the input parameters to the model are modified. This is to reduce the considerable effort that may be required to measure them without affecting the accuracy of the model results.

Keywords: static roll modelling, sensitivity analysis, rollover threshold, simulation, articulated vehicles, vehicle design, turning manoeuvres

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