11th World Congress on Structural and Multidisciplinary Optimisation
07th -12th, June 2015, Sydney Australia

Simulation Study on the Prediction of Dangerous Conditions for Occupant in a Running Vehicle Equipped with Airbag

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Abstract

Generally, when a vehicle is equipped with an airbag, crash tests are conducted to check the performance of the airbag on certain defined conditions. Even if the performance of the airbag is perfect during the test, it may hurt vehicle occupant in reality traffic due to changed boundary conditions, such as the out-of-position occupant. This paper has built a simulation model for occupant and restraint system including an airbag by using MADYMO software, and conducted the crash simulation for a combination of different boundary conditions: different size dummies, different sitting positions, and different crash speed. According to the results of the MADYMO simulations, a metamodel was constructed and validated, through which all the dangerous conditions for vehicle occupant could be predicted by using NSGA-II genetic optimization algorithm. The results of this research will be useful in further intelligent airbag system development.

Keywords: simulation study; prediction of dangerous conditions; vehicle occupant; airbag; metamodel.