Stochastic Analysis and Optimization of Full Vehicle System for Offset Crush

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ABSTRACT

This paper attempts to account for the uncertainties inherited in the parameters involved in the offset crush of full vehicle system. The main objective of this work is to perform a reliability-based analysis to obtain the statistical characteristics of dash and toe intrusion responses in a 40 mph offset crush for a full vehicle system due to manufacture, material and design variability that will be defined in this study. Monte Carlo simulation Method (MCS) will be used in the analysis. Also, a reliability optimization will be performed to search for design solutions for the intrusion that meet the specified requirements on probability of constraint violation on an existing design. Single Loop, Single Variable (SLSV) approach will be used for this analysis. Finally, Six Sigma robust design will be performed to reduce the sensitivity of performance to uncertainties and therefore reduce the probability of constraint violation.