Development of Numerical Analysis Techniques for Frontal Airbag

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ABSTRACT

Frontal impact collisions are the most frequent cause of serious motor vehicle accidents. Many protection equipments are widely used in the vehicle for reducing the injury severity of occupant. Airbags are one of more effective occupant restraint systems for preventing injury in the case of a collision accident. Airbags can cushion the crush forces and reduce the chance that the occupant's head and upper body will strike some part of the vehicle's interior. In order to develop and assess an effective and safe airbag for occupant protection, the sled and crash tests must be performed. And the occupant injuries are necessary to conform the safety regulations. Real car crash tests are complex and expensive. CAE methodologies can increase product development process efficiency. As such, computer simulation is an economical and time efficient alternative to physical testing. In this study, airbag module technologies in MADYNA were discussed. Finite element model of airbag was created using the MADYNA software. In order to assess the safety of airbag module, the numerical simulations of static deployment test and pendulum test were performed. Furthermore, the sled test and offset frontal impact test were used to assess an effective and safe airbag for occupant protection. To verify the accuracy of the proposed airbag module, sled test and offset frontal impact test models, simulation results are compared with those obtained from experimental tests. These numerical procedures can establish the simulation capability of car crash test. The results indicate that the numerical model proposed in this study has considerable potential for guiding the future development of safety and efficiency of airbag.

Keywords : Frontal airbag ; Static Deployment Test ; Sled Test

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