DESIGN OF AN AUTOMOBILE SIDE AIRBAG AND HEAD PROTECTION SYSTEM

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ABSTRACT

The automobile frontal impact protection has evolved to a state that it is excellent at preventing severe head injuries resulting from frontal impacts. However, the side impact protection is not as fully developed as the frontal impact protection. In addition, given the limited amount of space between an occupant ~d the door structure, side impact protection deserves more attention to prevent severe injuries during an automobile side impact. In this research, several different high-energy side pole impact scenarios are evaluated for a typical earlier model sedan, followed by designing an airbag that protect the thorax and two airbags that protect the head during side impact. The two airbags that protect the head are classified as the Head Protection System. In the side pole impact simulation process, a combination of several different airbags in the car has been assessed, starting with a car having neither side air bag nor Head Protection System. Then, by adding side airbag and Head Protection System airbag one at a time, the performance of the different types of airbags can be compared. At the same time, Thoracic Trauma Index (TTI) that quantifies side impact injury criterion has been obtained and evaluated for each of these scenarios. In terms of the head protection, the Head Injury Criteria (IDC), which measures the risk of head injury, is evaluated. The research shows that an occupant will suffer less chest injuries in a car that is equipped with side airbags compared to a car that has no side airbag. Head Protection System and side airbag working side by side will further minimize the chest injury risks.