

Effect of sitting posture on the protection performance of the airbag

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ABSTRACT

The function of passenger airbags is to cushion the impact force and to avoid occupant to contact with car inner structures in the collisions. However, a sitting posture will directly affect the time of occupant to contact with airbag. The effect of airbag in occupant protection will be reduced when the occupant sits really far or close to the steering wheel. For a smart airbag, the sensor system can measure the occupant sitting posture, and then decide the best time of airbag deployment for increasing the protection effectiveness. Analysis of sitting posture for an intelligent airbag system is necessary. The time and size of airbag deployment needs to be calculated by the microprocessor. To effectively protect the driver in a collision accident, microprocessor design plays an important role in an intelligent airbag system. For guiding the microprocessor design of airbag system, the full-car crash test data and real word driver data are investigated to analyze and compare the driver 's sitting posture in this study. The sled test simulations which considered the male and female dummy with six kinds of sitting posture are performed using the LS-DYNA3D numerical code. The head and chest injuries of dummy are calculated, and the effects of sitting posture and airbag contact time on the injuries are also analyzed. Finally, a concept design of intelligent airbag system is proposed based on the relationship of occupant body, sitting posture and airbag deployment obtained herein. The analysis results of sitting posture and airbag contact time and concept design of new airbag has considerable potential for guiding the future development of intelligent airbag system.

Keywords : LS-DYNA、Sled Test、Frontal impact、Sitting posture、Smart airbag

Table of Contents

第一章 前言.....1	1.1 研究動機.....1	1.2 文獻回顧.....4	1.3 研究目的.....7	1.4 論文架構.....8
第二章 乘員坐姿之探討.....11	2.1 實車碰撞坐姿數據.....12	2.1.1 男女性人偶的分析.....12	2.1.2 廠牌車型的分析.....13	2.2 實際駕駛坐姿數據.....14
2.2.1 駕駛身高的分析.....15	2.2.2 車型的分析.....15	2.3 碰撞資料與實際量測的比較.....16	第三章 有限元素模型之建構與數值模擬.....47	3.1 衝擊台車有限元素模型.....47
3.2 Hybrid 實驗人偶.....48	3.2.1 Hybrid 男、女性實驗人偶的構造.....49	3.3 實驗人偶的校正.....50	3.3.1 頭部落下測試.....50	3.3.2 頸部擺臂撞擊測試.....51
3.3.3 胸部擺錘撞擊測試.....52	3.3.4 膝部擺錘撞擊測試.....53	3.4 人偶有限元素模型.....54	3.4.1 Hybrid 50% 男性人偶有限元模型.....55	3.4.2 Hybrid 5% 女性人偶有限元模型.....57
3.5 有限元素人偶模型之驗證.....60	3.5.1 頭部落下測試模擬.....60	3.5.2 頸部擺臂撞擊測試模擬.....62	3.5.3 胸部擺錘撞擊測試模擬.....64	3.5.4 膝部擺錘撞擊測試模擬.....66
3.6 正撞氣囊數值模型.....67	3.7 駕駛坐姿與安全性分析.....68	3.7.1 駕駛坐姿數值模擬.....69	3.7.2 氣囊防護效益之分析.....71	第四章 智慧型氣囊概念設計.....114
4.1 智慧型氣囊系統設計概念.....115	4.2 駕駛坐姿資料庫的建立.....116	4.3 兩段式氣囊設計概念.....116	4.4 智慧型氣囊概念性應用.....118	第五章 結論與未來展望.....122
參考文獻.....124				

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