Effect of sittingposture on the protection performance of the airbag

E-mail: 322029@ mail.dyu.edu.tw

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

REFERENCES

1.　　　　　　　　　　　　　　　　　　　　　　　　　2008　2.

　　　　　　　2004　3.

　2006　4.S. Moss and Y. Huang, "Development of an Advanced Finite Element Model Database of the Hybrid　Crash Test Dummy Family, " SAE Paper No.971042, 1997. 5.Linhuo Shi, " PAB Deployment Simulation with Curved Retainer", International LS-DYNA Users Conference. 6.E. H. Kuner , W. Schlickewei, and D. Oltmanns , " Injury reduction by the airbag in accidents",Elsevier Science Ltd. ,Injury Vol.27 ,No.3 ,pp.185-188 ,1996. 7.Susan A. Ferguson , Donald W. Reinfurt, and Allan F. Williams , " Survey of Passenger and Driver Attitudes in Airbag Deployment Crashes" , Journal of Safety Research Vol.28, NO.1, PP.55-62,1997.