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ADAS 긴급제동장치 작동 한계 상황에 관한 연구

최지훈* · 김종혁** · 한현서** · 김송희** · 전우정***

A Study on Limitation of Autonomous Emergency Braking Operation

Jihun Choi*, Jonghyuk Kim**, Hyunseo Han**, Songhui Kim**, Woojeong Jeon***

Key Words : ADAS(첨단운전자지원시스템), AEB(긴급제동장치), Overlap(중첩량), EuroNCAP AEB Test

ABSTRACT

In recent years, vehicles equipped with advanced driver assistance systems(ADAS) with the purpose of driving safely, are widely used. AEB(Autonomous Emergency Braking) is a function that automatically operates the braking force to avoid or mitigate a collision when an emergency such as another vehicle, pedestrian or bicycle suddenly appears. From 2022, a law is in the process of making it mandatory for passenger vehicles to be equipped with AEB. So, it is expected that the traffic accidents analysis related to AEB increase. Currently, vehicle manufactures are designing the AEB to operate normally only when the overlap between the AEB vehicle and GVT(Global Vehicle Target) is -50% to +50% according to the EuroNCAP AEB test. Since many traffic accidents are of a type that deviated from the EuroNCAP AEB test, drivers who have suffered an accident under the condition that AEB is not in operation may complain about the defect of the AEB. So, it is very important to analyze the cause of the accident. In this study, a camera and a radar sensor that are the same type as the mobileye camera and radar sensor installed in IONIQ5 were installed. The driving test was performed under conditions deviating from EuroNCAP AEB test(when GVT overlap is less than 50% & GVT is rotated at an angle of 20° ~ 30° in 100% overlap). As a result, In the IONIQ5, it was confirmed that the AEB does not work when the overlap is less than 25% and the GVT angle is more than 25°. When the overlap was 25%, the lateral distance of the GVT measured by the camera and radar sensor was 1.11 m and 1.24 m on average, respectively. In addition, it was found that the longitudinal distance of the GVT measured by the camera and radar sensor differed by up to 2.94 m when the GVT angle was more than 25°. In the future, it is believed that the analysis of AEB non-operation accidents will be possible through this study and we plan to continuously study the limitation of AEB operation for various vehicle models.

* 국립과학수사연구원 교통과/공업연구관
** 국립과학수사연구원 교통과/공업연구사
*** 국립과학수사연구원 교통과/과장
E-mail : djihun@korea.kr

교통사고 외상환자 인체상해 판별 시뮬레이션 구현 방안

공준석*

An Approach to Identification on Trauma Injuries Computer-aid Simulations in Motor Vehicle Crashes

Joon Seok Kong*

Key Words : Trauma injury(외상), Computer-aid simulation(컴퓨터 시뮬레이션), Finite element analysis(유한요소법), Sled model(승객모델), Motor vehicle crashes(충돌사고)

ABSTRACT

Computer-aided simulations has traditionally been widely used to ensure the crash safety of vehicles released by auto manufacturers. However, this approach has difficulties for requiring a computer performance in determining the traumatic injury of patients in motor vehicle crashes. Nevertheless, rigid model-based crash simulations have limitations in representing human biofidelity. Therefore, it is necessary to determine the trauma injuries using finite element methodologies in order to obtain a relatively approximated solution. These methods estimate whether the models are reliable in the virtual environment corresponding to actual trauma injuries. This study intends to conduct a methodology to determine trauma injuries through crash simulations for patients who visited the emergency trauma center involved in a motor vehicle collision.

* 연세대학교 원주의과대학 자동차의과학연구소/연구원
E-mail : jskong4208@gmail.com

충돌시뮬레이션의 생체적합성 검증과 타당성 확보

신재호*

Verification and Validation Methodologies of Human Model Biofidelity for Crash Simulations

Jaeho Shin*

Key Words : Injury Response(상해 반응), Post Mortem Human Subject(사체), Anthropometric Test Device(인체 시험 모형), Finite Element Model(유한 요소 모델), Biofidelity(인체 충실도)

ABSTRACT

Human injury response under impact loadings is being evaluated by crash research institutes and academic laboratories to prevent or reduce injury-causing factors. These injury investigations are performed using PMHS (Post Mortem Human Subject), ATD (Anthropometric Test Device), FE (Finite Element) models. The biofidelity of these surrogates are much different, as they are designed for testing repeatedly. Human FE models are available for impact biomechanics and crash accident investigation; however these models are limited in their capabilities, due to the lack of real human response and computational resources. In this study, the processes of verification, calibration and validation for human model are discussed in order to calculate trustworthy human response and tolerance under impact loadings.

* 경일대학교 기계자동차학부/교수
E-mail : jhshin@kiu.kr