수동안전 I

충돌안전 법규 선행성능 개발을 위한 선형등가모델을 트럭 차체 BIW 최적화

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Structure Optimization Considering the Impact Regulation Performance of Truck CAB BIW using Equivalent Linear Model

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Key Words : Equivalent linear model(선형등가모델), Topology/Size optimization(위상/사이즈 최적화), System identification()

ABSTRACT

Occupant protection and body stiffness of vehicle cab is required for all the commercial vehicles. Body stiffness included linear elastic behavior is the simplest way to optimization. However, Automobile crash optimization considering nonlinearities is fairly expensive because sensitivity information is difficult to calculate. To overcome this difficulty, the structural of truck cab which has a sensitive effect on truck cab strength regulation considering nonlinearities have been investigated by topology and size optimization simulation using Equivalent Linear Model(ELM). The optimization simulation using ELM use 1D element model and convert the non-linear load to the linear load to evaluate the cab strength regulation performance in the stage of concept development. Throughout this study, the method is used and has been proven to be useful to develop a more optimized design in consideration of the linear and non-linear mechanical characteristics. We get the information where is the most sensitive site in using the structure to raise the stiffness and strength.

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6-레이어 포맷을 이용한 비포장도로 안전성 평가 시나리오

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Safety Evaluation Scenarios for Autonomous Vehicle Using 6-Layer Format

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Key Words : Autonomous Driving(자율주행), Pegasus Project(페가수스 프로젝트), 6-Layer Format(6-레이어 포맷), Safety Evaluation Scenario(안정성 평가 시나리오)

ABSTRACT

This paper develops scenarios to evaluate the safety performance of autonomous vehicles on unpaved scenarios using 6-layer format. These scenarios are derived from an Army accident case. We adapt these scenarios to unpaved roads. This adaption is validated via computer simulation. We observe the scan lines of vehicles become tangled on the straight road that makes the cognitive abilities of the vehicle low and the lane-keeping is unable when vehicles entering curved off-roads over 40km/h. The developed scenarios will contribute to enhancing stability from the perspective of introducing autonomous driving technology to Korean military.

충돌 안전성 확보를 위한 칵핏 모듈 시스템 설계 구조 제안

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Crash Performance Improvement Guide for Cockpit Module System

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Key Words : Cockpit module system(칵핏 모듈 시스템), Occupant injury(승객 상해), Knee bolster(니볼스터), System requirement(설계 요구 조건), Optimization(최적화)

ABSTRACT

In terms of vehicle collision performance, the cockpit module system is the part that generates the most contact between passengers and the interior and is equipped with safety devices such as airbags. In particular, we have based on U.S. regulation 40kph unbelted test to propose design requirement that satisfies the crash performance of the cockpit module system in harsh environments. Existing cockpit module systems are designed not to exceed the upper limit of the femur load (10kN) of 50% male dummy, and we aim to derive design requirements to address the problem of excessive forward movement and chest displacement due to the lack of knee support of 5% female dummy. First, in order to propose the standard design shape, the cockpit module parts with high impact performance contribution were set as design variables. Second, design requirements and limitation value of femur load were set as design constraints. Based on the design variables and constraints, we create the meta-model from CAE, and derive the optimal design shape using a meta-model.

Based on the results of this study, it is expected that the problem of dissatisfaction with the collision regulation can be solved early when designing the cockpit module system by considering the design requirements from the initial stage when developing future models.

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타이어 제조결함 발생 원인 분석과 차량 내구 및 성능 영향도 연구

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Study on Cause of Tire Manufacturing Defect and the Effect of Vehicle Durability and Performance

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Key Words : Tire(타이어), Tire manufacturing(타이어 제조), Defect(결함), Durability(내구), Rubber(고무), Carcass(카카스), Cord(코드), Steel belt(스틸 벨트)

ABSTRACT

Tire is a crucial part that affects the performance of a vehicle. Furthermore, tire is the only part in a vehicle that is directly contact with the road surface so directly related to safety. In order to perform these various roles, tire is composed of various materials such as rubber, steel, and fiber. And these joints of different materials part, there is a high possibility of durability and manufacturing problems. In particular, in recent years, due to customer's demand of high performance and electrification, we use many high-inch and low-aspect-ratio tires. But their high manufacturing difficulty makes them vulnerable to tire quality. Therefore, in this paper, we studied on tire quality problems that are likely to be found. First, we succeeded in manufacturing tires that reproduced major initial manufacturing quality problems by changing tire process conditions. By doing them, we were able to discover process elements that affect quality issues, such as tire building processes, and figure out improvement points. Secondly, we conducted an evaluation of tire performance and durability test between tires that reproduce quality problems and normal tires to check the impact of each quality problem. The results derived from this paper are usefully used to manage the manufacturing quality of tires.

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실차 충돌평가에서의 착좌자세에 따른 탑승자 충돌안전성 연구

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Study about the Crash Safety of Occupants According to the Seat Postures Through Full Scale Crash Test Types.

Jeongmin In*, Jaehong Ma**, Hyungjin Chang***

Key Words : Lv.4/4+ autonomous vehicle(Lv.4/4+ 자율주행차), ODB(변형벽 정면 부분정면충돌), MPDB(차대차충돌), Full reclining seating posture(좌석등받이를 최대한 젖힌 착석 자세), Normal sitting posture(정상적인 착좌자세), Submarine mechanism(좌석안전띠의 골반띠가 골반부위를 적절히 구속하지 못하는 현상)

ABSTRACT

The occupants of the Lv.4/4+ autonomous vehicle will happen more diverse seating postures than non-autonomous vehicle. Typically predictable seating postures of an autonomous vehicle occupants is considered to be the fully reclined seatback position. This study conducted to analyze the occupant injury effects of front seats between the full reclining seating posture (50±5 degree) and the normal sitting posture (20±3 degree) using non-autonomous used vehicles according to the Offset frontal deformable barrier crash(ODB), MPDB(Mobile Progressive Deformable barrier) crash and side collision test. The occupants of full reclined seatback position happened that head, neck, and chest injuries increased sharply compared to the normal sitting position from ODB test. In particular, the Female occupants are more likely to happen the submarine mechanism related to severe abdominal injuries during frontal crash. In a side impact, the chest injury of the full reclined seatback position was higher than the normal sitting position. The causes of high injuries in the full reclined seatback position are considered to be improper applications of the crash restraint devices (airbag and seat-belts, etc.). The results of this study can utilize the reference materials for developing the crash evaluation methods and the performance requirements of the crash restraint systems in about the Lv.4/4+ autonomous vehicles in terms of crash safety in the future.

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수소버스 CHSS의 충돌 안전도 평가방안 연구

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Evaluation Method of the Crashwortiness for Hydrogen Bus Compressed Hydrogen Storage System

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Key Words : Hydrogen bus(수소 버스), Compressed Hydrogen Storage System(수소 저장 시스템), Impact tests(충돌 시험), Crashworthiness(충돌 안전도)

ABSTRACT

The structure safety of hydrogen buses is being evaluated by crash research institutes and academic laboratories for the successful introduction of hydrogen buses. This study is focused on the evaluation methodology for hydrogen bus structure safety with a CHSS (Compressed Hydrogen Storage System) located under the bus floor. The conceptual CHSS structure in order to evaluate safety countermeasures along with computational and experimental approaches are discussed in terms of the side impact loading conditions. A side crash procedure of conceptual CHSS structure was investigated and impact simulations were performed. The computational and experimental approaches showed the concept side impact test to verify crashworthiness assessment for the CHSS of hydrogen buses.

후기

본 연구는 '수소버스 안전성 평가기술 및 장비개발'의 연구결과로서 국토교통부와 국토교통과학기술진흥원의 지원하에 수행되었으며, 이에 관계자 여러분께 감사드립니다.

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