The Analysis of Occupant Injury in Side Impact of Traffic Accident

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ABSTRACT

As the issue of passenger safety in vehicles become more prominent, safety requirements for passenger vehicles become ever more stringent. Concern from the public has caused car manufactures and related industries to invest significant financial, material, and human resources to develop safety equipment in the hopes of reducing accidents and injury. Although collisions between motor vehicles are most commonly either head-on or rear-end crashes, side impact crashes account for a considerable portion of overall collision picture. Injuries tend to be more severe in cars in side impacts compared with cars in front and rear impacts, largely because of the limiter side-crush space. In order to provide a basis from which safety equipment in vehicles can be designed and vehicle safety laws can be established, investigation the relationship between injuries suffered in a collision and vehicle design is an important task. This paper describes the validation of side impact dummy model to perform the complete side impact simulation. The model can be used to evaluate occupant compartment intrusion and to assess occupant protection countermeasures in various side impact scenarios. A baseline finite element model of the side impact dummy (SID) used in the United States safety regulation, FMVSS 214, Side Impact Protection [47], was refined and calibrated using pendulum test data. Pendulum dynamic tests and sled dynamic impact test data were used to verify the SID model responses. The model compare well with test data. A full vehicle public domain FE model of a Ford Taurus passenger car, model year 1990, was developed using reverse engineering. The FE-SID model was placed in the Ford Taurus vehicle model and dynamic simulation using LS-DYNA3D were conducted for perpendicular side impacts. Occupant injury parameters were compared and verified with test data. Finally, the FE-SID model apply to two kinds of car to car impact simulations are introduced. Also, the analyses about injury values are illustrated in side impact simulation.

Keywords : Side Impact ; LS-DYNA3D ; SID

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