Development and Validation of Pedestrian Deformable Finite Element Model

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ABSTRACT

Recently, Pedestrian protection has become an increasingly important consideration in vehicle crash safety. Pedestrian-vehicle crashes cause a significant number of pedestrian fatalities and injuries globally. Computer models are powerful tools for understanding how to reduce the injuries severity in such crashes. Real-world studies of pedestrians provide an important source of information for evaluating pedestrian model dynamic performance and ability to reconstruct injury-causing events. This study describes the validation process of deformable pedestrian model using published post-mortem human subject (PMHS) trajectory and head resultant velocity corridors, and demonstrates its applicability to pedestrian - vehicle impact research, the pedestrian injuries are also analyzed in impact with vehicle at three velocities 25, 32 and 40km/h. This study implemented the deformable pedestrian model using LS-DYNA finite element code. The pedestrian model is validated by comparison the displacement trajectories of the head, pelvis, knee and foot with PMHS data. The pedestrian injuries are analyzed in this study include serious injuries of parts which will effect on the pedestrian life such as injuries of head, leg, thigh, thorax, neck and pelvis. The finite element pedestrian model thus obtained can help assess the friendliness of vehicles with pedestrian in traffic crash and assist in the future development of pedestrian safety technologies.

Keywords : Pedestrian deformable model, pedestrian injuries, pedestrian protection, pedestrian-vehicle impact, full scale pedestrian model.

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