Whole body model of a 10-year-old child for pediatric injury prediction

Published date: Oct. 11, 2013

Technology description

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A computational whole body 10-year-old (YO) FE (Finite Element) model which is anatomically accurate based on the clinical images. The model was composed ofhigh quality elements for accurate stress/ strain predictions and possessed high biofidelity to accurately predict body responses under external mechanical loadings. Preliminary verification ofthe FE model against available cadaver test data was also performed. This invention is a new simulation finite element model consisting of detailed organs definition, tissues, ligaments, muscles of a 10-year-old child. The model was created to study response of the pediatric body responses from head to-toe during external loading.

Background

Motor vehicle injuries are a leading cause of death among children in the United States. In the United States during 2010, more than 1,200 children ages 14 years and younger died as occupants in motor vehicle crashes, and approximately 171,000 were injured. Until recently automakers and their suppliers have studied how to best protect adult drivers and passengers in vehicle crashes, there hasn't been that much separating the study of crash effects on adults versus children. Recently, there has been more research in human body finite element (FE) models for children and seniors so that engineers can account for differences in their body characteristics when designing vehicle safety systems. The aim is to close the gap between current safety testing and the actual injuries sustained by these two vulnerable populations, ultimately reducing injuries to all occupants regardless of age.

Advantages

Since pediatric cadavers are rarely available due to ethical and other concerns, computational methods become extremely important for biomechanical studies for the prediction and ultimately the avoidance of automobile injuries based on the age of the occupant.

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