

Car to Bicycle Collision Simulation - Analysis of Head Injury Mechanism in 1 Box Car to Bicycle Collision -

Project Representative

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Abstract

According to the statistical data of the National Police Agency, the number of cyclist fatalities is the third highest in Japan, preceded by those of pedestrians and car occupants. The head is the most commonly injured body region for the cyclist fatalities. The head has a chance to impact the ground directly as well as the car body. This study simulated 400 collision cases between 1 box car and bicycle. A human FE model was used to investigate the relationship between head contact points and injuries such as skull fracture and diffuse axonal injury (DAI). When the head impacted the A-pillar or the header, skull fracture and DAI were predicted. DAI occurred only when head impact speed was high. When the head impacted the ground, DAI was predicted in case of high car speed. Skull fracture was predicted even when car speed was low.

The simulation of ground contact cases required much longer CPU time, approximately four times, compared to that of vehicle contact cases. It required approximately three years to finish 400 cases with a common server. It was completed within six months by using the Earth Simulator with massively parallel computing performance.

Keywords: car, bicycle, crash safety, ground contact, head injury