

# Mathematical Simulation of Real-World Pedestrian – Vehicle Collisions

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## ABSTRACT

Pedestrian-vehicle crashes result in a substantial number of pedestrian fatalities and injuries worldwide. Computer models are powerful tools in understanding how the severity of injuries could have been reduced in the crash. Pedestrian real-world cases serve as an important source of information to evaluate the dynamic performance of pedestrian models and their ability to reconstruct injury-causing events.

The objective of this study was to evaluate the ability of a mathematical pedestrian model to assess the severity of an impact using real-world data. The dynamic performance of the pedestrian model was evaluated by the reconstruction of six real-world pedestrian collisions, which occurred during 1995-2003 in the surroundings of Hanover, Germany. The impact severities were 32-59km/h. Each case contained information about the pre-crash, crash, and post-crash events. This information included hospital reports and detailed description of damages to the vehicle, pedestrian injuries, and the crash environment collected at the scene. The evaluation focused on head injuries since these are the most common cause of severe injuries and fatalities of pedestrians involved in passenger vehicle-pedestrian crashes.

The results showed that the model produced injury measures and readings of the magnitude expected for the highest severity head injuries sustained by the pedestrian in the reconstructed case. Furthermore it highlights the usability of mathematical pedestrian models in evaluating the severity of a vehicle-pedestrian collision.

## Keywords

Pedestrian, real-world, simulation, crash, Madymo.