Validation of human pedestrian models using laboratory data as well as accident reconstruction

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Human pedestrian models have been developed and improved continually. This paper shows the latest stage in development and validation of the multibody pedestrian model released with MADYMO, as well as ongoing FE developments. Furthermore applications in accident reconstruction are reviewed with an outlook to validating human models using real world pedestrian accident data.

The biofidelity of the multibody pedestrian model has been verified using a range of full pedestrian-vehicle impact tests with a large range in body sizes (16 male, 2 female, height 160-192 cm, weight 53.5-90 kg). The simulation results were objectively correlated to the experimental data. Overall, the model predicted the measured response well. In particular the head kinematics were accurately predicted, indicated by global correlation scores over 90 %. The correlation score for the bumper forces and accelerations of various body parts was lower (47-64 %), which was largely attributed to the limited information available on the vehicle contact characteristics (stiffness, damping, deformation). Also, the effects of the large range in published leg fracture tolerances on the predicted risk to leg fracture by the pedestrian model were analyzed in detail. The validated mid-size male model was scaled to a range of body sizes, including children and females.