C2   Numerical Models in Motor Vehicle Accident Reconstruction With Case Studies

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The goal of this presentation is to equip the attendee with an understanding of which collisions are suitable for numerical simulation techniques and some of the sensitive and insensitive input parameters used in the simulations.

This presentation will impact the forensic community and/or humanity by making the forensic community aware to highlight sensitive input parameters in commercial accident reconstruction simulation software and contrasts some of the available software. This presentation demonstrates that a variety of computer programs are capable of generating similar and accurate results.

Reconstruction of a motor vehicle accident using different computer software packages renders similar results if the packages are used appropriately. However, pre and post impact driver actions/reactions need to be interpreted with caution and can affect the results of the analysis.

High-speed collisions can be analyzed using several available tools, which are more directly applicable than for low speed collisions. This is due in part to the fact that much of accident reconstruction theory and available test data originated with test speeds in the 30-35 mph range. A brief overview of the types of tools available for reconstructing high-speed accidents is presented. Several popular computer programs employing these tools and the associated assumptions are utilized in case studies. A high-speed crash test in which one vehicle is driven into the side of a stationary vehicle and an actual "real world" left turning accident with two moving vehicles are used for illustration and comparison of the available methods and computer packages. Several computer programs, which are widely used for accident reconstruction, are used to reconstruct the collisions. The programs WinSlam© and EDCRASH™ are used to analyze the impacts from an energy standpoint. The programs PC Crash, EDSMAC4™, and DyMESH® simulate the impact and subsequent postimpact travel. The results of the various methods and their relationships to the known crash test parameters will be addressed. Additionally, some of the assumptions and inputs required by the tools are varied to illustrate their effects on the final results.

Some simulation programs are not always directly applicable to low velocity impacts. "Low velocity" impacts between motor vehicles is a somewhat arbitrary term that here will refer to collisions involving very little or no physical crushing of the vehicles. Low velocity collisions often cannot be adequately analyzed using some traditional high-speed numerical techniques.

Accident Reconstruction, Computer Modeling, Simulation Comparison