An Improved Chestband Analysis Program that Computes Omni-directional Deformation and Three-Dimensional Kinematics

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ABSTRACT

A software program has been created in MATLAB to graphically represent the deformation of an object, primarily the thorax, during impact using output from a chestband and a six degree-of-freedom (6DOF) cube. This project was completed at the request of engineers in the Applied Biomechanics Division of NHTSA/VRTC. The new MATLAB code is an improvement to an older FORTRAN software package that is available to analyze chestband output. A major limitation of this FORTRAN program is that it is not capable of side impact data analysis. In addition, the output of the FORTRAN program was a 2-D overhead graphical representation of the deformation of the chestband and it constrained the data points representing the spine and the sternum to be fixed to a posterior-anterior axis. The new MATLAB program has been designed to represent the deformation of the chestband along with 3-D translation capabilities. The new program allows for more accurate representations of deformation due to omni-directional impact and is not limited to simply frontal impacts. In addition to the benefits already listed, the new program is more stable, more user-friendly, and easier to alter due to the open architecture of the MATLAB environment.