

SIMPLIFIED MODELING AND PARAMETRIC STUDY OF HEAD IMPACT USING MULTIBODY AND NONLINEAR FINITE ELEMENT APPROACHES

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Summer 1997

ABSTRACT

This work presents a parametric study on Head Injury, using two computer packages, MADYMO and LS-DYNA3D. Head injury assessment can be done in two different ways, testing method and analytical method. According to Federal Aviation Regulations injury must be evaluated in a test which simulates crash situation. But testing approaches are expensive. Analytical solutions can serve as effective tools to study the effect of different parameters and help to reduce the cost of testing.

The objective of this work is then, to carefully consider the effect of various important factors such as mass and velocity in crash-impact scenario and compare the results with the standard test results in order to propose a simplified test procedure which possibly involves a human head model only.

In order to follow logical steps in analysis, parametric study started in MADYMO. This program is capable of simulating test situations with high accuracy. Then, for detail and more in depth analysis, nonlinear finite element code, LS-DYNA3D, is used. At the end, conclusions of the analysis show the importance and effect of each factor and propose some recommendations for future work.