

MODEL WITH THREE DEGREES OF FREEDOM FOR STUDYING THE UNBELTED OCCUPANT'S BODY MOTION IN AUTOMOBILE INTERIOR DURING THE FRONTAL IMPACT

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Abstract

The paper presents a simplified mechanical model dedicated to study the unbelted occupant's kinematic in automobile's interior during a frontal impact. The model is an lumped mass one, with three degrees of freedom which allows the evaluation of the displacements, velocities, accelerations, angular displacements, angular velocities and angular accelerations of the segments which simulate the human body, parameters which can be used later for evaluating the occupant's level of injury during the crash event. For solving the model it was started from the Lagrange's equations, due to the complexity of the obtained equations, it was created a Matlab programme, based on the numerical method Runge-Kutta of fourth order, which helped us to obtain the results presented in this paper-work.

Keywords

Mechanical model, occupant's kinematic, impact, mechanical response, Runge-Kutta.