

Simulation and Optimization of an Automotive Composite Side-Impact Pipes

A. Khalkhali

Automotive Simulation and Optimal Design Research Laboratory, School of Automotive Engineering, Iran University of Science and Technology, Tehran, Iran

Abstract

Nowadays, car accidents are one of the transportation problems around the world. Therefore, improving the safety attribute of the automakers products is the most important target in such companies. The real crash tests that are performed in the automotive testing companies are costly and time-consuming. For this reason, in the recent years, crash simulation using finite element method has been widely expanded. In this article, side crash behavior of one of Iranian automakers products named DENA is investigated numerically. In this way, the side panel of the DENA car is first meshed by HyperMesh software and then the side crash is simulated using finite element method in LS-DYNA software. In this regard, collision speed, vehicle connections, material definition, barrier model, and initial vehicle collision conditions are considered according to ECE R95. This article aims to evaluate the influence of the side impact pipe on the improvement of the side crash behavior of DENA car. Moreover, effects of replacing steel side impact pipe with the GFRP (Glass fiber reinforced polymer) composite one is investigated. The results show that by adding a composite pipe, the safety of the car in the collision is generally increased, and more energy absorption is created (about 10%). And as a result, the weight of the car and consequently the fuel consumption of the car is reduced.

Biography

Abolfazl Khalkhali received his M.Sc. (Eng.) in Mechanical Engineering in 2005 and the Ph.D. degree in Applied Mechanical Engineering in 2010 from The University of Guilan, Iran. He was faculty member at Engineering Department of the Islamic Azad University, East Tehran Branch from 2007 to 2011. He has served as the Head of Mechanical Engineering Department and also Dean of Engineering Department at the Islamic Azad University,

East Tehran Branch. He came to the Iran University of He was Deputy of Chancellor in Research and Education of the School of Automotive Engineering in IUST from 2011 to 2015. He is also the head of Automotive Simulation and Optimal Design research laboratory in IUST. His research interests are automotive body structural design, finite element analysis and simulation, multi-objective optimization, product family and platform design, GMDH-type neural networks, robust and reliability-based design and optimization using evolutionary algorithms.