

Effect of Rainflow Cycle Number on Fatigue Lifetime of an Arm of Vehicle Suspension System

Authors : Hatem Mrad, Mohamed Bouazara, Fouad Erchiqui

Abstract : Fatigue, is considered as one of the main cause of mechanical properties degradation of mechanical parts. Probability and reliability methods are appropriate for fatigue analysis using uncertainties that exist in fatigue material or process parameters. Current work deals with the study of the effect of the number and counting Rainflow cycle on fatigue lifetime (cumulative damage) of an upper arm of the vehicle suspension system. The major part of the fatigue damage induced in suspension arm is caused by two main classes of parameters. The first is related to the materials properties and the second is the road excitation or the applied force of the passenger's number. Therefore, Young's modulus and road excitation are selected as input parameters to conduct repetitive simulations by Monte Carlo (MC) algorithm. Latin hypercube sampling method is used to generate these parameters. Response surface method is established according to fatigue lifetime of each combination of input parameters according to strain-life method. A PYTHON script was developed to automatize finite element simulations of the upper arm according to a design of experiments.

Keywords : fatigue, monte carlo, rainflow cycle, response surface, suspension system

Conference Title : ICME 2016 : International Conference on Manufacturing Engineering

Conference Location : Stockholm, Sweden

Conference Dates : July 11-12, 2016