
High cycle fatigue reliability approach based on Kakuno and Kawada criterion with an application for design an Equal-Leaves Spring

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The developed reliability based design methods have the advantage to exploit the uncertainty of the different parameters defining a fatigue criterion. In this paper, we analyze the High Cycle Fatigue (HCF) behavior taking into account the dispersion effects of the loading and the materials parameters and using the multi-axial HCF criterion of Kakuno and Kawada. The reliability based design of the HCF behavior was computed using the Artificial Neural Networks (ANN). This approach leads to obtain iso-probabilistic criterion diagrams corresponding to fixed scattering parameters.

In an automotive suspension system, the leaf spring design has an important role to provide essentially the safety for the vehicle occupants. Accordingly, an application of this approach for design an Equal-Leaves Spring (ELS) is achieved as well as an effect analysis on the HCF reliability of the different random ELS design parameters is studied in this work by using the Design of Experiments (DoE) method.

Keywords:

High cycle fatigue; Artificial neural networks; Reliability; Design of Experiments; Leaf springs.

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