High cycle fatigue reliability prediction based on S-N curves: uniaxial loading

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Résumé

The main objective of this paper is to develop a probabilistic approach of High Cycle Fatigue (HCF) prediction of material by taking into account the modifications induced by the variation of the loading parameters (stress and number of cycles), and those of the material parameters defining the S-N curve. The fatigue reliability is determined using fatigue Wöhler analytical expression and Monte Carlo simulation assessment. Probabilistic Wöhler Diagrams (PWD) are established to predict the HCF behavior of the material. In this regard, four cases are studied by varying the deterministic or probabilistic hypothesis for the stress and number of cycle values.The Design of Experiments (DoE) techniques are used in this work by varying the factors of interest in a full factorial design to evaluate the effect and the interaction of some factors influencing the fatigue reliability.

Mots-Clés: Fatigue reliability, Monte Carlo simulation, Wöhler curve, design of experiment

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