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MARKOV CHAIN APPLICATION IN FATIGUE RELIABILITY ANALYSIS FOR DURABILITY ASSESSMENT OF A VEHICLE CRANKSHAFT

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ABSTRACT

This paper presents the durability assessment in terms of assessing the reliability analysis under random loading stress using the probabilistic approach of the stochastic process for structural health monitoring. The Markov process proposed in this study has the capability of generating synthetic loading stress data by embedding the actual maximum and minimum loading stresses. This is done by continuously updating the synthetic loading stress in order to generate the stress loading data history for each rotational speed. The purpose of this is to reduce the credible intervals between each data point for reliability analysis through the linear fatigue damage accumulation rule. The accuracy of the Markov process was validated through the finite element analysis and the accuracy and is statistically correlated between the actual and synthetic loading stress. The Markov process showed that the accuracy of the simulated fatigue life has an accuracy of 95% boundary condition when the actual and synthetic loading stress is statistically correlated using finite element analysis. Hence, it was able to provide a highly accurate assessment of durability for the improvement and control of risk factors for overcoming the extensive time and cost required in reliability testing.

Keywords: durability, markov, random, reliability, and stochastic.