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Review

Use of the higher spectra in the low-amplitude fatigue testing ☆

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ABSTRACT

Particular place among the methods of vibroacoustic diagnostics is occupied by the problems of early defect detection. Let us note that the process of defect formation may lead to both. The intensification of non-linear phenomena as well as the occurrence of non-stationary effects even if during the early stages the intensity of defects is small while the growth of the level of vibration and noise is negligible, as contrasted with emergency states. A useful method is to test the higher order spectra, which, respectively, define the non-linear effects. A test bed for low-amplitude tests (10^6–10^7 cycles) of fatigue processes was built. The authors built a small-dimension test bed for diagnosing the low-amplitude fatigue processes. Small dimensions result from the proposal of mounting the test bed on shaker. The dimensions of test bed are $0.2 \times 0.2 \times 0.2$ m and its weight does not exceed 2 kg, with a titan head mounted directly on the piezoelectric generator. The main goal of these investigations is to examine the low-amplitude fatigue strength of a model of the cantilever supported section of a shaft and impact of dynamic stress, which is especially important in the case of high frequency loading which is predominant in mounting elements of rotating machinery.

Contents

1. Introduction

In 1960s and 1970s solutions which put stress on the possibility of controlling the growth of cracks and faults that initially existed in the material were applied when designing structures subjected to variable loads, which could lead to the effect of fatigue-related damage. Another approach assumed that the existing cracks propagated only until reaching the

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