

COUPLED FORMS OF VIBRATIONS IN ROTATING MACHINERY

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Abstract

The paper contains a study of mutual interactions, which occur between lateral, torsional and axial vibrations in multi-supported rotors operating in the non-linear range.

Presented have been the methods of modelling of the selected defects (e.g. rotor cracks and bearings misalignments). These defects have been regarded as the factors generating the coupled forms of vibrations.

In the work presented has been a part of work devoted to the influence of circumferential location of the crack and kinetostatic and dynamic rotor deflection line on the system dynamical response. Applicability of coupled and phase vibration spectra analysis in diagnostics of such kind of defects has been indicated.

Problems linked with the dynamics of rotating machinery are subject of investigations in several domestic and foreign research centres . Despite abundant information on this topic, there are still numerous problems to be solved. This regards primarily to the analysis of non-linear vibrations and also coupled forms of lateral, axial and torsional vibrations.

Analysis of this type of phenomena requires application of very advanced models and computer software. The problems becomes outmost difficult in the case of large power industry objects such as turbogenerators of large power. Coupled forms of vibration are generally a result of different kinds of couplings taking place in the system and interactions between construction and material imperfections. Presented here as example can be rotor cracks and misalignment of the rotor line. Modelling of such kind of imperfections and subsequently analysis of their influence on system operation represents undoubtedly one of contemporary challenges in this branch of science.