भारतीय प्रौद्योगिकी संस्थान गुवाहाटी • Indian Institute of Technology Guwahati

INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student : Bhyri Rajeswara Rao

Roll Number : 156103029

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Thesis Title: ANALYSIS AND IDENTIFICATION OF DYNAMIC TRANSMISSION ERROR PARAMETERS IN A GEARED ROTOR USING FULL SPECTRUM

Name of Thesis Supervisor(s) : Prof. Rajiv Tiwari and Dr. Maruthi Rao D

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SHORT ABSTRACT

A dominant source of vibration in geared-rotor systems are the gear mesh fault parameters. They include the asymmetric transmission error, the mesh stiffness and damping, and the gear runout. The present work deals with the experimental identification of aforementioned parameters. A mathematical model of geared-rotor system has been developed using Lagrangian dynamics. Equations of motion are transformed into frequency domain using the full-spectrum response analysis. These transformed equations are used to develop an identification algorithm based on least-squares fit to estimate the transmission error and gear mesh dynamic parameters. The system identification algorithm is initially verified using numerical simulations. The robustness of the algorithm is checked by introducing white Gaussian noise in the simulated responses. A geared rotor experimental rig was developed and used to measure responses at gear locations in two orthogonal directions. Measured responses are transformed in frequency domain using the full spectrum analysis and used in the present novel identification algorithm to identify the gear parameters. The identified parameters are validated by comparing the numerically generated full-spectrum response using experimentally estimated parameters and that from the experimental rig.