

A Fault Analysis Cracked-Rotor-to-Stator Rub and Unbalance by Vibration Analysis Technique

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Abstract : An analytical 4-DOF nonlinear model of a de Laval rotor-stator system based on Energy Principles has been used theoretically and experimentally to investigate fault symptoms in a rotating system. The faults, namely rotor-stator-rub, crack and unbalance are modelled as excitations on the rotor shaft. Mayes steering function is used to simulate the breathing behaviour of the crack. The fault analysis technique is based on waveform signal, orbits and Fast Fourier Transform (FFT) derived from simulated and real measured signals. Simulated and experimental results manifest considerable mutual resemblance of elliptic-shaped orbits and FFT for a same range of test data.

Keywords : a breathing crack, fault, FFT, nonlinear, orbit, rotor-stator rub, vibration analysis

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