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# Time-Frequency Characterization of a Cracked Rotor by Wigner–Ville Distribution and Wavelet Transform

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In the current paper, a cracked de Laval rotor has been represented by a simple hinge crack model and the system transient response numerically evaluated leading to solutions of the cracked and uncracked rotor's dynamic equation. Two strategies, namely Wigner-Ville distribution and Wavelet transform are then employed to obtain the time frequency features of the cracked and uncracked rotor system and the difference is presented and discussed. By simulation, the sensitivity of the Wigner-Ville distribution and the wavelet transform to the stiffness variation is investigated and the influence of the unbalance and the unbalance angle on the Wigner-Ville distribution and the wavelet transform is given. The time-frequency features are unique and could well serve as identification criteria of cracked rotor.

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