Identifiant de la contribution : **163** Type : **non spécifié**

COMO1#1 - Acoustic Monitoring of Rolling Element Bearings using a Sparse Microphone Array

mardi 11 juillet 2023 14:00 (20)

Acoustic monitoring of rolling element bearings in industrial environments can provide a non-contact solution for early detection of bearing failures and prevention of costly downtime. Nevertheless, extracting the bearing signature of interest from the other contributions in the acoustic signals remains a key challenge. A possible approach to improve the Signal-to-Noise Ratio (SNR) of bearing signatures is to exploit spatial information, obtained using acoustic imaging techniques. However, Conventional microphone arrays are rarely used for bearing condition monitoring in an industrial setting due to their extensive number of microphones, which leads to high complexity and cost. In this paper, we propose a sparse microphone array, exploiting the modulation characteristics of the bearing signatures. The process begins with the extraction of the envelope from the raw signals, followed by frequency domain conventional beamforming on the envelope signals to generate acoustic imaging maps of the bearing signals. These maps are then used to optimize an indicator within a predefined region, effectively separating the bearing signal. The validity of this methodology is confirmed through numerical simulations of point sources in a free field environment, using simple amplitude modulated signals and signals generated with a phenomenological rolling element bearing model. Finally, experimental results collected from an in-house test rig demonstrate the robustness and accuracy of the proposed methodology in industrial environments.

Presenter(s) : WU XIAN

Classification par session : Survishno 6 / Condition monitoring 1