



Identifiant de la contribution : 253

Type : non spécifié

## ”SIGPRO#4 - Exploring the potential of sparse spectral estimation for vibration analysis”

*mardi 11 juillet 2023 11:40 (20)*

Recently, sparse signal processing algorithms have attracted much interest in the field of vibration-based machine monitoring as they leverage the assumption that most vibrations are sparse in at least one domain. While a large body of research focuses on the application of sparsity for gear and bearing fault detection in the time and envelope domain, this paper investigates the performance of a sparse data-adaptive spectral estimator as a precursor tool for other vibration signal pre-processing techniques. The Sparse Iterative Covariance-based Estimator or SPICE is a hyperparameter-free sparse spectral estimation method that has some promising statistical properties when compared to the standard Fourier transform. These characteristics make SPICE an interesting candidate for the analysis of complex vibration data coming from industrial machinery. This paper examines the efficacy of SPICE for vibration analysis by employing it for instantaneous angular speed estimation through integration with the multi-order probabilistic approach. Its advantages and shortcomings are explored and compared to the standard short-time Fourier transform as well as the short-time iterative adaptive approach. This new SPICE-based speed estimation approach is validated on realistic simulated data. The performance of the proposed methodology is then showcased on two complex wind turbine gearbox vibration data sets.

**Presenter(s) :** PEETERS CÉDRIC

**Classification par session :** Survishno 3 / Signal Processing