

**Anas Had (LASPI, universit  Saint Etienne)**

Title : Rotating Machines diagnosis with Time-Frequency Analysis: Focus on Helicopter Gearboxes.

Abstract : Numerous methods employed in the domain of machine fault diagnosis rely on the assumption that signals exhibit stationarity. However, a significant portion of rotating machines operates under fluctuating conditions, leading to non-stationary signals. In these dynamic scenarios, time-frequency representations become invaluable tools for extracting critical information to assess machine health. The primary objective of this presentation is to illustrate the utility of time-frequency representations in diagnosing faults in rotating machinery and creating health indicators, with a specific focus on their application to helicopter gearbox analysis.

**J rome Antoni (LVA, INSA Lyon)**

Title : A brief review of time-frequency applications in mechanical signal processing : state-of-the-art and challenges

Abstract :

**Fadi Karkafi (Safran et INSA Lyon)**

Title : A Multi-Order Synchro-squeezing Transform approach for Instantaneous Angular Speed estimation

Abstract : Under non-stationary conditions, estimating the Instantaneous Angular Speed (IAS) of rotating machines from vibration measurements is a practical way for encoder-free condition monitoring. In this presentation, a novel Multi Order Synchro-squeezing Transform (MOST) approach will be addressed for estimating the IAS in low SNR conditions. Firstly, it provides a preliminary estimation of the instantaneous speed for frequency reallocation in the signals TFR; then it defines a normalized threshold to preserve the corresponding energy in the TFR at each bin of time. Secondly, the probability density functions are constructed using multiple harmonics, benefitting from the repetitive profile of the IAS. Finally, an automatic setting is proposed to keep the useful information of given harmonics and neglect the noisy ones. The method is thoroughly investigated by assessing its performance on a vibration signal of a turbojet engine and a wind turbine considering multiple harmonics in a noisy environment.