

## Case Studies: AI & ML — Acoustic Emission Testing (AET)

**Abstract:** This talk will focus on the fundamentals of Acoustic Emission Testing (AET), and the rapidly emerging application of artificial intelligence and machine learning (AI/ML) in the field of nondestructive testing and evaluation (NDT/E). AET is one of the most sophisticated and data-intensive technologies in the NDT/E space and is ripe for applications incorporating the use of AI/ML as a consequence. In the aerospace sector, additive manufacturing (AM) and in-situ monitoring of acoustic signatures is an important application of AET that has seen a plethora of academic literature published in recent years, with an emphasis on using advanced ML algorithms to extract relevant patterns and predict the state of the AM process. Another important application is damage identification in jet engines with the aid of signal processing tools and Deep Learning (DL), which is one of the most powerful technologies to emerge from the ML research community in the past decade. Among all these details, the talk will also discuss relevant details of ML algorithms and the challenges of applying ML algorithms and techniques to AET datasets. The material presented in this talk is based on a review of literature published on the use of AET for in-situ monitoring of AM processes along with other published and upcoming work contributed by the speaker in various avenues, including journals and ASNT committee papers.