

INFLUENCE OF RESIDUAL STRESSES ON THE FATIGUE BEHAVIOUR OF ADDITIVE MANUFACTURED SAMPLES

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ABSTRACT

This invited session aims to address the critical challenges and advancements in understanding the influence of residual stresses on the fatigue behaviour of components produced through additive manufacturing (AM). AM technologies, such as selective laser melting (SLM) and electron beam melting (EBM), offer unparalleled design flexibility and material efficiency. However, the complex microstructures and residual stresses inherent to AM processes pose significant challenges to predicting and enhancing fatigue performance.

To address these challenges, this session will delve into the following areas:

- **Advanced Simulation Techniques:** Exploring state-of-the-art computational methods to accurately predict residual stress distributions and their impact on fatigue life.
- **Novel Experimental Approaches:** Discussing innovative experimental techniques for characterizing residual stresses and fatigue behaviour in AM components, including in-situ measurements and advanced microscopy.
- **Failure Mechanisms and Crack Propagation:** Investigating the mechanisms of crack initiation and propagation under fatigue loading, with a focus on the role of residual stresses.
- **Design Optimization and Mitigation Strategies:** Exploring strategies to mitigate the detrimental effects of residual stresses and optimize the design of AM components for enhanced fatigue performance.