MM 33: Invited Talk: P. Sonnweber-Ribic

Time: Friday 9:30–10:00 Location: H10

Invited Talk MM 33.1 Fri 9:30 H10

Fatigue in steels: Micromechanical modelling of cyclic damage — •Petra Sonnweber-Ribic[1], Alexandra Stark[1], and Christian Elsässer[2] — [1]Robert Bosch GmbH, Renningen — [2]Fraunhofer-Institut für Werkstoffmechanik IWM, Freiburg

Fatigue is a common phenomenon in engineering structures and can lead to unexpected failures, especially in critical components such as aircrafts, trains, and automotive parts. Understanding the mechanisms behind fatigue is crucial for ensuring the safety and reliability of these structures. A specific challenge of fatigue lies in the difficulty of external detection, as the initial stages of fatigue damage manifest as highly localized processes within specific microstructural domains.

The micromechanical modelling offers a method for predicting fatigue properties and achieving a more profound comprehension of damage and relevant micromechanical parameters. Initially, this is based on the representation of the underlying microstructure of the material and the description of local plastic deformation using the crystal plasticity method. This approach has been successfully employed in industrial environment to assess the role of different metallographic phases in relation to local cyclic damage, among other applications.

Subsequently, this methodology can be enhanced by integrating a hydrogen diffusion approach and advanced damage models to consider the influence of hydrogen on fatigue damage mechanisms. The relevance of different influencing factors is analyzed based on selected examples.