Contribution ID: **5** Type: **not specified**

Deep Learning Methods for Acoustic Emission Evaluation

Friday, 25 June 2021 14:00 (20 minutes)

The goal of this paper is to summarize deep learning methods and apply some of these architectures to real data from tensile tests of metallic materials. Here many existing neural networks are applied to a signal gained from acoustic emission to determine the beginning of plasticity in the material. Plastic deformation is accompanied by microscopic events such as a slip of atomic plane dislocations which is hardly detectable by other methods. The potential of machine learning is demonstrated on two tensile tests where the material is strained until it collapses. The examined networks proved well to reliably predict the risk of collapse together with changes in the ultrasound signal emission.

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Session Classification: Machine Learning in Acoustic Emission