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A comprehensive approach for evaluation of tribological phenomena by acoustic emission

Abstract

In tribology, the science of friction and wear, there is a lack of measurement methods for the real-time investigation of tribocontacts. Friction and wear cause a conversion of energy, from which a share is converted into elastic waves - the so-called acoustic emission (AE). These waves can be measured on the surface of the solid and utilized for the evaluation of the generating mechanism. This dissertation describes a comprehensive approach for utilization of acoustic emission generated by friction, for evaluation of the underlying tribological processes. Firstly, brief introductions into tribology, acoustic emission testing and the associated challenges are presented. In the following chapter, a method for calibration of piezoelectric sensors is described and practically applied. Then, the acoustic emission of modelled wear events is acquired by the calibrated sensors and correlated with various wear phenomena. The final section is constituted by the presentation and application of methods for identification of single AE events within a quasi-continuous signal.