

## A TECHNIQUE TO DETECT CRACKS IN MICROSCOPIC IMAGES OF METAL SURFACES

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**Abstract.** In this work a novel approach to crack detection in metals is presented, in which traditional pattern recognition techniques are applied to process microscopic images. Crack detection has a relevant impact on various areas including metallography, avionics and medical prosthesis manufacturing. The images are stand-alone in the sense that the method does not require the correlation of different shots to detect the cracks. The main difficulties lie in the fact that the images are microscopic, which typically feature noise and uneven lighting.

The proposed technique is based on pattern recognition, since the process intends to reproduce a human-inspired classification, analyzing the surroundings of every candidate point. The method behaves as expected when cracks approach grain boundaries. The candidates are obtained by combining a local thresholding technique and a set of anisotropic diffusion steps, both to counteract the light gradient effect and to remove noise without a significant loss of information.

On the tests performed, the method proved to be very accurate. The causes of misclassification have been clearly identified, hence further work could be done in order to improve the process.