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Praca doktorska

Metody oceny defektów powierzchni z
wykorzystaniem technik analizy i rozpoznawania
obrazów

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Methods of assessment of surface defects with use of image analysis and recognition techniques.

Abstract

Investigations presented in the work concern an application of vision systems and image processing and analysis methods to technical diagnostics (control). The purpose of the presented research was to elaborate an methodic that allows us to detect, localize and estimate anomalies manifested on surfaces of different technical objects. It was assumed that exemplary images of defects were unknown. The one of the main assumptions was that identification of the anomaly in the image and estimation of the defects are independent on image texture. As the result of undertaken research, an algorithm consisting in four stages was proposed. The goal of the main stages was: 1. to differentiate the type of a texture (regular, random or plane), 2. to detect and localize a region with an anomaly, 3. to analyse and assess distinguished anomalies and to asses significance of the identified defect. In the algorithm different methods of image analysis were used (especially texture analysis methods such as Singular Value Decomposition method and Grey Level Co-occurrence method). On the stage of anomaly and defect assessment the knowledge from an expert and data from technical standards were used.

Verification of the elaborated procedures was led on two types of images - the images from the accessible bases of textures and the second - on the images acquired in the laboratory. The second group of images represented surfaces of two types of technical objects: welded joints and wood floorings. The images were acquired at Silesian University of Technology at Department of Fundamentals of Machinery Design at Gliwice.