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SURFACE ROUGHNESS MEASUREMENT USING SHADOWS PRODUCED BY CIRCULATING LIGHT SOURCES

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We propose a new measurement method for a degree of roughness of a given object surface. This method is not to measure the degree of roughness of the object surface directly, but to estimate the roughness from surface images. Named as circulating light sources (CLS), its multiple light sources aligned in a circle illuminate sequentially, and produce images including shadow of the object surface. As the shadows on the images reflect a shape of the object surface, the shapes of the surface, concavo-convex shape, can be estimated by these shadows. In this paper, features of surface roughness are extracted by a Wavelet Multiresolution Analysis (MRA) from the shadow images produced by the CLS, and are classified by a Self-Organizing Map (SOM). A roughness of an unknown surface can be estimated by the SOM after learning.

Keywords: Surface roughness measurement; shadow; circulating light sources; foreign pattern elimination; wavelet multiresolution analysis; self-organizing map