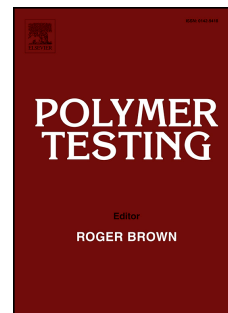


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Inspection of extremely slight aesthetic defects in a polymeric polarizer using the edge of light between black and white stripes

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Test Method

Inspection of extremely slight aesthetic defects in a polymeric polarizer using the edge of light between black and white stripes

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Abstract: Machine vision systems have been widely used on industrial production lines because of their advantages such as automation and contactless inspection. The detection of defects in a polymeric polarizer is a typical application of machine vision. Extremely slight transparent aesthetic defects (ESTADs) in a polymeric polarizer cannot be imaged using conventional illumination such as white light and structured light. Therefore, this study proposed a novel and automated inspection method for detecting ESTADs by employing the edge of light in structured light illumination, and this was found to drastically enhance the image contrast. An optical model was established to investigate the imaging enhancement mechanism. The simulation results were consistent with the experimental results, and the lighting principle was also determined to interpret the imaging phenomena. Finally, active lighting scanning was performed to demonstrate the feasibility of this inspection scheme; the proposed method is efficient for the real-time and in situ inspection of defects in polymer films and products.

Keywords: Machine vision; Defect inspection; Edge of light; Imaging enhancement mechanism; Polymeric polarizer; Extremely slight transparent aesthetic defect.

1. Introduction

Polymeric polarizers are vital components of thin-film transistor liquid crystal display (LCD) panels, which are now widely employed in consumer electronic products such as computers, TVs and mobile phones. Six transparent polymeric film layers constitute a polymeric polarizer. Aesthetic defects such as impurities, stains, scratches, dents and bubbles may form in any layer of the polarizer during the manufacturing progress. Although these defects may not affect functionality, they are aesthetically displeasing and have a crucial influence on a panel's quality. Hence,

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