

## Automatic Detection of Defects in Ornamental Limestone Using Wavelets

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**Abstract :** A methodology based on wavelets is proposed for the automatic location and delimitation of defects in limestone plates. Natural defects include dark colored spots, crystal zones trapped in the stone, areas of abnormal contrast colors, cracks or fracture lines, and fossil patterns. Although some of these may or may not be considered as defects according to the intended use of the plate, the goal is to pair each stone with a map of defects that can be overlaid on a computer display. These layers of defects constitute a database that will allow the preliminary selection of matching tiles of a particular variety, with specific dimensions, for a requirement of N square meters, to be done on a desktop computer rather than by a two-hour search in the storage park, with human operators manipulating stone plates as large as 3 m x 2 m, weighing about one ton. Accident risks and work times are reduced, with a consequent increase in productivity. The base for the algorithm is wavelet decomposition executed in two instances of the original image, to detect both hypotheses &ndash; dark and clear defects. The existence and/or size of these defects are the gauge to classify the quality grade of the stone products. The tuning of parameters that are possible in the framework of the wavelets corresponds to different levels of accuracy in the drawing of the contours and selection of the defects size, which allows for the use of the map of defects to cut a selected stone into tiles with minimum waste, according the dimension of defects allowed.

**Keywords :** automatic detection, defects, fracture lines, wavelets

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