

AUTOMATED SHAPE RECOGNITION OF BINARY
IMAGES USING FOURIER ANALYSIS

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Some possibilities of the computerised shape recognition of outlines of particulate objects have been examined by filtering their Fourier coefficients through an empirical truth table, resulting in the classification of outlines by their likeness to simple geometrical shapes (circle, ellipse, triangle, square, rectangle, deltoid), allowing for discrepancies such as asymmetry, roundness and corrugation.

The shape recognition program was developed on a TRS-80 personal computer. The outlines of particles are scanned in 5° intervals, in polar coordinates. Ten pairs of Fourier coefficients are calculated from the outlines. The program contains additional facilities such as outline processing (delineation, mirroring, rotation etc.), graphic display of raw and processed outlines and of coefficients, calculation of area and perimeter and synthesis of outlines from calculated or inputted coefficients.

The method is applicable to the shape analysis of irregular particulate samples as a classification is possible even when the particles' outlines deviate considerably from the ideal geometrical shapes due to the rounding and displacement of apices from their theoretical positions. The widths of the windows in the truth table can be varied to suit the demands of a classification.