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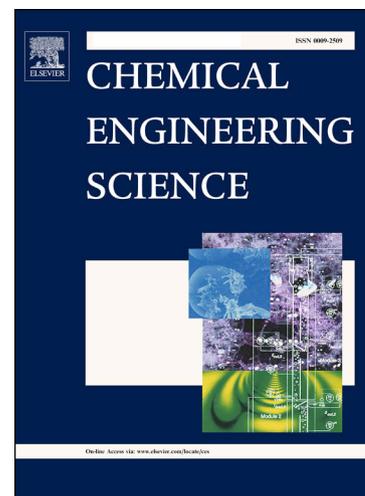
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# Image analysis framework with focus evaluation for in situ characterisation of particle size and shape attributes

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## Abstract

Particle processing industries, such as pharmaceutical, food processing and consumer goods sectors, increasingly require strategies to control and engineer particle attributes. In both traditional batch and continuous processes, particle size and shape need to be effectively monitored through in-line measurements from Process Analytical Technologies. However, obtaining quantitative information from these measurements has proven to be challenging and in-line imaging techniques are primarily used for qualitative purposes. Two key challenges are: 1) the presence of out-of-focus objects and 2) images only represent 2D projections of three-dimensional objects. In this work, a novel framework to process frames from in-line imaging probes incorporates a focus evaluation step in order to extract meaningful quantitative shape and size information through rejection of out-of-focus particles. Furthermore, a model is proposed that simulates the 2D projection of three-dimensional particles onto the focal plane and computes the corresponding size and shape distributions. The framework is quantified

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