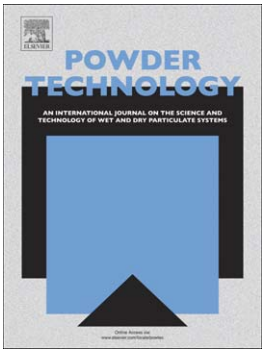

An image analysis technique for the particle mixing and heat transfer process in a pan coater

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An image analysis technique for the particle mixing and heat transfer process in a pan coater

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Abstract: Pan coaters are important equipments widely used in pharmaceutical industry. The coating performance of a pan coater is greatly influenced by the particle mixing process and heat transfer process in the particle bed. However, due to lack of appropriate measuring technique, the interplay of these two processes has not been well understood yet, which brings many uncertainties in optimizing the design and operation of pan coaters. In the present work, a non-invasive optical imaging technique is introduced to monitor the dynamic process of particle mixing and heat transfer, using a D400mm pan coater filled with groups of hot particles (red colored) and cold particles(white colored) as test example. The process of particle mixing and heat transfer is recorded by a RGB camera and an infrared thermograph camera, respectively. An image processing approach is then proposed to measure the time evolution of the feature variable (particle contacts and temperature variance) of the two processes. Based on a first-order regression model, the settling time of the particle mixing and heat transfer is then calculated and compared. By introducing a dimensionless feature variable, it is now possible and convenient to compare the transient behaviors of the two different physical processes (particle mixing and heat transfer). The effectiveness of the proposed measuring technique and image analysis methods are validated by experiments.

Keywords: rotary drum; pan coater; particle mixing; heat transfer; image processing; infrared image