Coupled Analysis of Toner Charging and Development

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Abstract

The charging behavior of two types of toner particles are studied in detail with specified size and shape distributions with three different charging blades. Discrete Element Method (DEM) is used to calculate the motion and charging of each toner particle passing between a roller and a blade. The output of this analysis is then used as an input to the analysis of the development process again using DEM method. For two print patterns, the development process is calculated. Consequently, the performance of the entire system is measure in terms of the output of the development process. The sensitivity of the performance to different physical properties is presented. These include the choice of the toner and the blade, as well as the voltage difference between the rollers during the development process. Although, these are only a few of the parameters defining the process, the present analytical approach allows a detailed understanding of charging the toner and development of the print pattern as one system. This approach can be extended to include other components of the system of the printing process.