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A study on the sensitivity of Drucker–Prager cap model parameters during die compaction of pharmaceutical powders

Swaminathan, Shrikant, sswamina@purdue.edu; Wassgren, Carl, Purdue University, United States

ABSTRACT

In powder die compaction, the characteristics of the end product are dictated by the mechanical properties of the powder being processed. A commonly used constitutive model describing the behavior of pharmaceutical powders during compaction is the modified-Drucker Prager Cap (DPC) model. The experiments used to measure DPC parameters are time consuming and, hence, limit the model's wide-spread use in industry. In the interest of potentially simplifying the DPC parameter measurement procedures, it is of interest to understand the influence each of the model parameters has on the prediction of a tablet's density field. In this study, a 2 k - p statistical analysis is performed on intratablet density gradients obtained from finite element simulation of powder compaction using a range of DPC parameters. The high and low values for the material parameters are selected based on literature reported values for pharmaceutical powders.