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**Granular flow model for stochastic additive manufacturing feedstock distributions** WILLIAM ROSENTHAL, AMANDA HOWARD, FRANCESCA GROGAN, Pacific Northwest National Laboratory, CHEMICAL DYNAMICS INITIATIVE TEAM — Selective laser sintering (SLS) additive manufacturing processes distribute layers of irregular particles which are then fused by exposure to a laser. Physical models to predict microstructure variability, especially pore characteristics, are restricted by unrealistic assumptions of powder regularity and the deposition process. 2D and 3D models for SLS feedstock particle distributions are presented which take into account particle characterization, the mechanical deposition process, and inter-particle cohesive forces. These three factors are shown to have significant effects on sub-optimal packing fractions of feedstock material, which suggest assumptions of sphericity and optimal packing may lead to inaccurate results if used in sintering models. The impact of these assumptions is illustrated by using the granular feedstock model to initialize a phase-field SLS model. Sensitivity analysis of pore structure features shows the assumptions about the granular flow characteristics play a central role in the variability of the sintered microstructure.

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