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Quantifying Particle Segregation in Sequential Layers fabricated by Additive Manufacturing

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Abstract

Suspensions are used in Ceramic Stereolithography[1](CerSLA) and other material processing methods. We applied Fast Fourier Transforms[2] (FFTs) in a novel way to signals generated from ceramic processing methods to address flaws resulting from sedimentation. We compared our analysis with traditional measures of sedimentation to show that this novel quantification of sedimentation is able to distinguish finer, subtler patterns of sedimentation. The explanation and application of FFTs and signal processing provided in this article enables the reader to use FFTs and signal processing in a broader way to further optimise and quantify materials processing methods.
Sedimentation, Additive Manufacturing, Quantification, Fast Fourier Transforms, Ceramic Stereolithography

Keywords: Additive manufacturing; Ceramic suspension; Ceramic processing; Particle Segregation; Fast Fourier Transforms

1. Introduction

Particle suspensions are used in a number of materials processes from the fabrication of pharmaceuticals to the fabrication of high performance ceramics [1,2]. Suspensions of coarser or denser particles may undergo differential sedimentation [3-6]. Differential sedimentation results in both non-uniform production as well as flaw formation. Quantification of the spatially varying particle size in these spatially

[1] Ceramic Stereolithography (CerSLA)
[2] Fast Fourier Transforms (FFTs)