**LSI Data Analysis used in Reference13**

During 3D printing, speckle images are captured continuously at 50 frames per second. This document explains how these speckle patterns are analyzed to obtain the polymer motion that leads to layer bonding. The general analysis algorithm that is used is based on Fourier Transforms and is explained in depth in this article13.

During the experiment, one LSI image is generated every 0.25 s through the following procedure.

1. Obtain the most recent 16 speckle images from the image buffer in the computer’s memory. Treat each pixel as a separate time series. Subtract the average intensity to obtain an intensity fluctuation around zero.
2. Use a standard fast Fourier Transform (fft) algorithm to convert the data to the frequency domain. Take the absolute value of the amplitude of the second frequency, which corresponds to motion with a frequency of 6.25 Hz, for further visualization. Square this value and normalize by dividing through the framerate of 50 and the series length of 16 to obtain the power density converted to decibels.
3. False color the power density for each pixel to obtain the LSI images shown in the manuscript. To improve the image quality and reduce the effect of noise artifacts, use a smoothing filter twice the speckle size.