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Optimization of Imaging Parameters to Determine Flow Velocity Using Nanoparticles

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ABSTRACT

Microfluidic flow chambers have been developed and used to measure flow at the microscopic level. Nanoparticles can be used to track the fluid flow within the chamber and this allows for accurate velocity measures. Microscope parameters used for experimentation differ across various projects and resources; therefore, there is a need to determine the best combination of settings for the equipment at hand. Once appropriate settings are selected, images of the flow are captured with a confocal microscope and can be analyzed using custom written MATLAB code. A pair cross-correlation function is used to determine where the particles have traveled in the flow as a function of time. Pair correlation has proven to surpass the limitations of other techniques such as fluorescent recovery after photo-bleaching and single particle tracking. A proper protocol for microfluidic nanoparticle imaging and analysis is now developed to be used for future applications that utilize the same particles and confocal microscope.

KEYWORDS

Pair correlation, confocal, line scan, microfluidic flow

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