

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

A Method to Improve the Accuracy of Particle Diameter Measurements from Shadowgraph Images¹ MARTIN A. ERININ, DAN WANG, XINAN LIU, JAMES H. DUNCAN, University of Maryland — A method to improve the accuracy of the measurement of the diameter of particles using shadowgraph images is discussed. To obtain data for analysis, a transparent glass calibration reticle, marked with black circular dots of known diameters, is imaged with a high-resolution digital camera using backlighting separately from both a collimated laser beam and diffuse white light. The diameter and intensity of each dot is measured by fitting an inverse hyperbolic tangent function to the particle image intensity map. Using these calibration measurements, a relationship between the apparent diameter and intensity of the dot and its actual diameter and position relative to the focal plane of the lens is determined. It is found that the intensity decreases and apparent diameter increases/decreases (for collimated/diffuse light) with increasing distance from the focal plane. Using the relationships between the measured properties of each dot and its actual size and position, an experimental calibration method has been developed to increase the particle-diameter-dependent range of distances from the focal plane for which accurate particle diameter measurements can be made.

¹The support of the National Science Foundation under grant OCE0751853 from the Division of Ocean Sciences is gratefully acknowledged.

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Date submitted: 31 Jul 2015

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