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Improved Absorption and Phase Contrast PIV Via Multi-Source Imaging Techniques

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Previous research in the field of Particle Image Velocimetry (PIV) has highlighted the need for high spatio-temporal resolution [[1]] as well as a distinction between static and dynamic imaging optimization [2]. Traditional single-source imaging systems optimized for small spot sizes are constrained by physical limitations, such as maximum anode power density. By utilising multiple sources with small spot sizes, anode power density is maintained while increasing overall brightness. The resultant image (see Figure 1), while not necessarily suitable for static imaging, provides increased information density for more accurate PIV analysis.

Presented here is the preliminary investigation into multi-source PIV imaging regimes. Two forms of this technology are displayed; Aperture-type applications (see Figure 1), and the characteristically equivalent flat-panel array source applications. Through computational simulations experimentally validated using a liquid metal jet source, we demonstrate this novel technology's capability for significantly increased PIV accuracy with reduced source luminosity. We further demonstrate that these properties can be greatly enhanced by judicious selection of source location and system geometry.

Indico rendering error

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[[1]] S. Dubsky, S. B. Hooper, K. K. W. Siu, and A. Fouras: J. R. Soc. Interface 9 (2012) 2213.

[2] I. Ng, D. M. Paganin and A. Fouras, J. Appl. Phys., vol. 112, no. 074701, pp. 1-11, 2012.

Keywords

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