INSTANTANEOUS VOLUMETRIC IMAGING WITH ORTHOGONAL LIGHT FIELDS

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Abstract:

Imaging dynamic processes at high spatiotemporal resolution is a recurrent challenge in biology. Recently, light field microscopy has emerged as a powerful technique for fast and instantaneous 3D imaging capable of capturing a 3D image with a single camera snapshot[1-3]. Here we show that simultaneous acquisition of two orthogonal light fields yields 3D images with high spatial resolution and significant reduction of reconstruction artefacts, thereby overcoming current limitations of light-field microscopy implementations[4]. We characterise and demonstrate the capabilities of the technique by performing imaging of fluorescent markers in the heart of Medaka juveniles. The high acquisition rates (over 140 volumes/s) makes it possible e.g. to image movement of single cardiomyocytes during the cardiac cycle without any aliasing effects.

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