

Far-field method for the characterisation of three-dimensional fields: vectorial polarimetry

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Abstract. The first attempt to completely characterise a three-dimensional field was done by Ellis and Dogariu with excellent results reported [1]. However, their method is based on near-field techniques, which limits its range of applications. In this work, we present an alternative far-field method for the characterisation of the three-dimensional field that results from the interaction of a tightly focused three-dimensional field [2] with a sub-resolution specimen. Our method is based on the analysis of the scattering-angle-resolved polarisation state distribution across the exit pupil of a high numerical aperture (NA) collector lens using standard polarimetry techniques. Details of the method, the experimental setup built to verify its capabilities, and numerical and first experimental evidence demonstrating that the method allows for high sensitivity on sub-resolution displacements of a sub-resolution specimen shall be presented [3]. This work is funded by Science Foundation Ireland grant No. 07/IN.1/1906 and Shimadzu Corporation, Japan. Oscar Rodríguez is grateful to the National Council for Science and Technology (CONACYT, Mexico) for the Ph.D. scholarship 177627.

References

1. J. Ellis and A. Dogariu, *Phys. Rev. Lett.*, **95**, 203905 (2005)
2. B. Richards and E. Wolf, *Proc. R. Soc. London A*, **253**, 358 (1959)
3. A. E. Elsner, S. A. Burns, J. J. Weiter and F. C. Delori, *Vision Research*, **36**, 191 (1996)
4. O. Rodríguez, *PhD. thesis* (National University of Galway, 2009)