

Spatial phase shifting for pure in-plane displacement and displacement-derivative measurements in electronic speckle pattern interferometry (ESPI)

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Hitherto no method, to our knowledge, was known to incorporate spatial phase shifting for the measurement of pure in-plane displacements. We demonstrate that the modified Duffy two-aperture configuration [Opt. Lett. **22**, 1958 (1996)], which is sensitive to only the in-plane displacement component and offers increased sensitivity, lends itself to measurement with spatial phase shifting. The configuration can also be used for obtaining displacement derivatives by the introduction of shear with the tilt of a mirror. © 1997 Optical Society of America

Key words: Spatial phase shifting, electronic speckle pattern interferometry, interferometry.

1. Introduction

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the CCD camera. Since ESPI requires the presence of carrier fringes, it is not easily implemented in shear ESPI. Only recently Pedrini *et al.*¹¹ used a Mach-Zehnder interferometer after the imaging lens, which is used for both shearing and generating carrier fringes. The modified Duffy configuration, however, lends itself to the generation of carrier