

Spatial phase shifting in electronic speckle pattern interferometry: minimization of phase reconstruction errors

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The advantages of spatial phase shifting (SPS) compared with temporal phase shifting in the field of electronic speckle pattern interferometry are described. Some periodic phase reconstruction errors occurring in SPS are discussed. It is shown that these errors become minimal for a spatial phase-shift angle of $2\pi/3$. Furthermore, a modified phase reconstruction formula is presented by which the noise in the reconstructed phase map is reduced. © 1997 Optical Society of America

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

1. Introduction

Temporal phase shifting (TPS) recently reviewed in

shift that then occurs between neighboring pixels of a video camera permits the local object phase to be

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spherical reference wave and of the object wave, respectively, at the location of the sensor in the x - y plane at $z = 0$. In an approximation, $\varphi_O(x, y)$ may be written as the sum of the phase of a spherical wave, $\varphi_{OS}(x, y)$, and a speckle phase, $\varphi(x, y)$, which contains the desired information about the object surface. By