Interferometry in Cylindrical and Polar Coordinates

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There are a large number of engineering measurement demands that involves cylindrical or circular geometries, for which Cartesian coordinates are not suitable. Cylindrical and polar coordinates would be much more natural choices. This work presents configurations of speckle or white light interferometers suitable for measuring wear, geometry and deformations of external and internal cylindrical parts, displacements, deformations, stresses and residual stresses in polar coordinates. Most of the configurations presented use conical mirrors, which perform optical transformations that allow direct measurement in cylindrical or polar coordinates. Conical mirrors or axicon diffractive optical elements are used for beam shaping so that the interferometer's sensitivity direction naturally results in polar or cylindrical coordinates. Some examples of real engineering demands are presented and briefly discussed. The results obtained met the demands for which the configurations were developed. We expect that the configurations and examples presented can serve as a reference for already consolidated applications and as a source of inspiration for new demands and possibilities.

Short biography:

Armando Albertazzi received his PhD from the Federal University of Santa Catarina, Brazil in 1989, where he is currently a full professor in the Mechanical Engineering Department. His main research interest is applications of Optical Metrology in mechanical quantities measurements such as 3D shapes, stresses and residual stresses, and inspection of composite materials. He has graduated 67 masters and 27 Dr. Eng. students. He is author or co-author of about 60 journal papers and 225 conference papers and two books. He has been a member of the International Scientific Committee or co-chair of several international conferences in this area. He is a Fellow of SPIE, member of OPTICA and Scientific Secretary of IMEKO TC2 on Optics and Photonics.