Abstracts

The Reconstruction of the Relative Phases and Polarization of the Electromagnetic Field Based on Amplitude Measurements

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This paper addresses the problem of determining the relative phases among the components of a monochromatic electromagnetic field at a single point based on amplitude measurements only. This problem arises in many practical situations, from the determination of the polarization characteristics of an antenna in its near field to the design of electromagnetic field probes that provide phase information without the need for synchronization leads. In this paper, we answer the following questions: 1) How is the phase information reconstruction from amplitude measurements? 2) Do amplitude measurements contain enough information to reconstruct the phases uniquely? 3) How many amplitude measurements are required? and 4) In what directions must the amplitude measurements be taken to ensure that the reconstructed phases are unique? To answer these questions, we propose and solve a more general problem in n dimensions, the special case where n = 3 being the solution to the problem above.

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