ALGEBRAIC RECONSTRUCTION TECHNIQUE FOR EXPERIMENTAL PHASE RETRIEVAL

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Phase images provide better resolution than intensity images, even allowing the possibility of going considerably beyond the Rayleigh's criterion limit [1]. Many methods and algorithms have been developed [2] and its application in a wide range of fields demonstrated [3]. We used a setup with dual acquisition to capture the data of the image plane and Fourier plane using a CCD camera. The Algebraic Reconstruction Technique (ART), based on Kaczmarz method for solving linear equation systems [4], allowed us to recover full amplitude and phase in real Fourier space from the images captured by the CCD camera. This solution avoids the loss of information introduced by measurement devices by the correlation of wavefronts in space and time and the impossibility of measuring the phases of the signal received at detectors. The important improvement of resolution and quantification power provided by this phase imaging technique makes it possible, for example, to account phase changes between interfaces in deep tissue imaging.

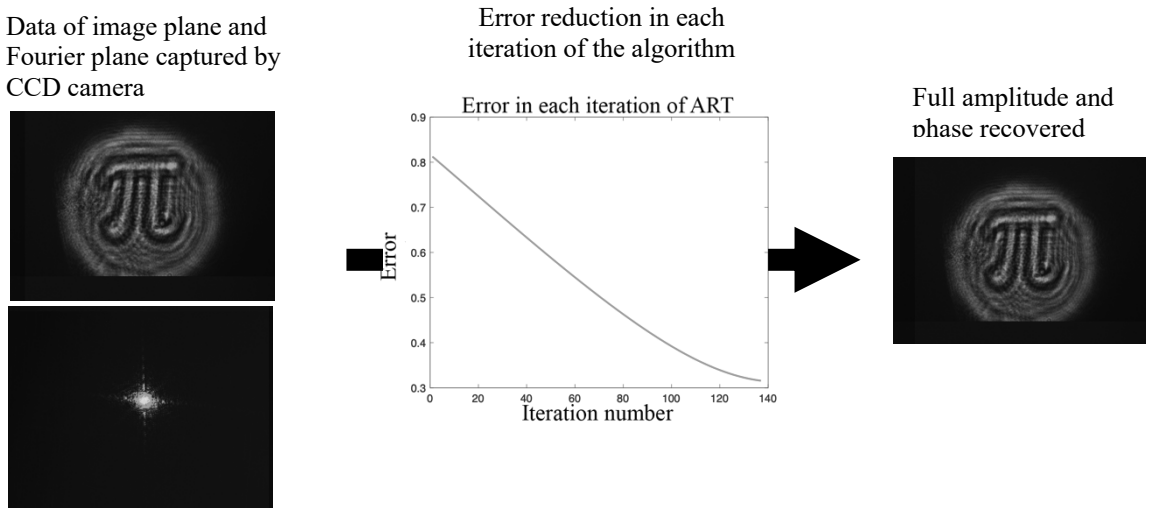

Figure 1: Intensity and phase modulus captured by CCD camera and the reconstructed image using ART based technique, showing the error reduction in each iteration of the algorithm.

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