Abstracts

Phase retrieval of gyrotron beams based on irradiance moments

We present the formulation of the moment method applied to the determination of phase profiles of microwave beams from known amplitudes. While traditional approaches to this problem employ an iterative error-reduction algorithm, the irradiance moment technique calculates a two-dimensional polynomial phasefront based on the moments of weighted intensity measurements. This novel formulation has the very important advantage of quantifying measurement error, thus allowing for its possible reduction. The validity of the irradiance moment approach is tested and confirmed by examining a simple case of an ideal Gaussian beam with and without measurement errors. The effectiveness of this approach is further demonstrated by applying intensity measurements from cold-test gyrotron data to produce a phasefront solution calculated via the irradiance moment technique. The accuracy of these results is shown to be comparable with that obtained from the previously developed iteration method.

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