Abstracts

Nonlinear Analysis of Phase Relationships in Quasi-Optical Oscillator Arrays

R.A. York. "Nonlinear Analysis of Phase Relationships in Quasi-Optical Oscillator Arrays." 1993 Transactions on Microwave Theory and Techniques 41.9 (Oct. 1993 [T-MTT] (Special Issue on Quasi-Optical Techniques)): 1799-1809.

A dynamic theory of coupled oscillators is developed and applied to the class of loosely-coupled quasi-optical oscillator arrays. This theory permits the calculation of stable, steady-state phase relationships between the oscillators. The distribution of free-running frequencies and the coupling parameters are most important in determining the behavior of the arrays. It is found that free-running frequencies of the peripheral elements have the strongest influence on the steady-state phase relationships. The influence of randomness in the frequency distribution is considered for the case of broadside beamforming, establishing a critical value for the coupling strength in order to maintain mutual synchronization with a specified maximum beam deviation. Techniques for simplifying the calculation of phase relationships for some common coupling parameters are also developed. The theory is supported by new experiments and other published results.

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