Abstracts

Self-Consistent Multi-Mode Time Domain Analysis of Gyrotrons

A. Jostingmeier, C. Rieckmann and A.S. Omar. "Self-Consistent Multi-Mode Time Domain Analysis of Gyrotrons." 1995 MTT-S International Microwave Symposium Digest 95.3 (1995 Vol. III [MWSYM]): 1383-1386.

A self-consistent time domain analysis of gyrotrons is presented which allows studying multi-mode, multi-frequency operation. The electromagnetic field in the gyrotron cavity is expanded with respect to complete sets of eigenfunctions so that space charge effects are included in the analysis. It is demonstrated that the strong numerical requirements of this method can be met by using a vector computer. The simulations show that the assumption of a monofrequent steady state operation of gyrotrons, which is made by the commonly used frequency domain methods is not always fulfilled. For a low Q gyrotron, both oscillation build-up and steady state operation is investigated including mode competition and window reflections.

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