Abstracts

A Study of the Single-Frequency Quenched-Domain Mode Gunn-Effect Oscillator

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A large-signal analysis of the high-frequency quenched-domain mode (Q-mode) of Gunn-effect devices has been developed. This is a phenomenological model and includes such effects as distinct domain formation and quenching processes, domain behavior in the presence of an RF voltage, displacement current, voltage dependence of the domain width, and others. The basis of the analysis is to obtain an instantaneous current-voltage transfer characteristic for the device and use it to generate the current waveform corresponding to a given periodic voltage waveform. The basic results of the large-signal analysis are then obtained from these current waveforms. The analysis reveals the distinguishing features of Q-mode oscillators. Admittance measurements on the oscillating device have been made and support the theoretical results for single-frequency operation. Applications of this analysis for investigating other nonlinear properties of these devices are suggested.

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