Abstracts

Noninvasive Experimental Determination of Charge and Voltage Distributions on an Active Surface

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Optical sampling has been employed to obtain the charge and voltage distributions on both a self oscillating active antenna and a power combining oscillating array of such active antennas. Various oscillating arrays have been fabricated on GaAs substrates, and the microwave characteristics of these active structures were tested before the optical sampling measurements were performed. The results of optical sampling measurements have revealed some interesting characteristics of both the individual antenna and array operation. It was noted that the charge and voltage distributions of a single isolated oscillating antenna were quite similar to those measured on an oscillating antenna in an array. Along with this, no edge effects were observed in the finite arrays. The charge and voltage distributions repeated smoothly in periods less that a wavelength with the excess phase necessary to achieve 180 degrees per cell being taken up by a large phase jump across each transistor, despite the fact that each transistor has dimension much smaller than the free space wavelength of the oscillation. Some analytical modeling results are presented to try to put the results into perspective.

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