Abstracts

TM surface-wave power combining by a planar active-lens amplifier

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Power combining of TM surface waves by a planar active-lens amplifier is the subject of this paper. An amplifier gain of 11 dB at 8.25 GHz with a 3-dB bandwidth of 0.65 GHz has been demonstrated. Gain is measured from input to output connector to facilitate comparisons with more conventional amplifiers. Measurements of output power versus input power are also presented. The amplifier behaved in a linear manner and no problems with spurious oscillations were encountered. Construction of the amplifier is compatible with planar fabrication technologies. A key component of the combiner is a microstrip-fed Yagi-Uda slot-array antenna for TM surface-wave excitation of a thick dielectric slab. Design and optimization guidelines for the antenna are presented as well as detailed spectral-domain and finite-difference time-domain (FDTD) analysis results. Measured and simulation results show an input return loss and front-to-back ratio better than 10 dB over a 5% bandwidth. Calculated and measured results for the fields radiated by the antenna confirm forward radiation of the dominant TM mode in the thick dielectric slab. Integration of the computed radiated fields shows the antenna has a surface-wave launching efficiency of 85%.

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