Abstracts

A Study of the Optimum Design of Wide-Band Parametric Amplifiers and Up-Converters

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Single-diode parametric amplifiers or up-converters using multiple-resonator filters as coupling networks can be made to have considerably larger bandwidths than corresponding amplifiers having single-resonator coupling circuits. Data are presented from which the coupling-filter bandwidths required for given coupling network complexity, diode parameters, and required gain can be determined for both parametric amplifiers and up-converters. In the cases of nondegenerate parametric amplifiers and up-converters, the fact that the diode must be brought to resonance at more than one frequency has an added limiting effect on bandwidth. Some trial amplifier designs are shown, and important considerations in the synthesis of the coupling filters are noted. It is seen that for the case upper-sideband up-converters, if a filter having n resonators is used in both the input and upper-sideband circuits, then the over-all response can be made to correspond to that of a filter with 2n resonators. The gain characteristics of the trial amplifier designs as determined with a digital computer are included. Computed responses ranging in bandwidth from 9 to 27 per cent are obtained for multi-resonator designs having C/sub 1// C/sub 0/ = 0.25.

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