

MONDAY, MAY 15, 1961

SESSION 2: PARAMETRIC DEVICES

2:00 PM - 4:45 PM

CHAIRMAN: W. W. MUMFORD
BELL TELEPHONE LAB
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2.2 A TRAVELING WAVE PARAMETRIC AMPLIFIER

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This paper is concerned with the analysis of a broadband traveling wave parametric amplifier in which the variable elements are connected in series with the signal line as opposed to one in which the elements are in shunt. In particular, the variable elements are taken to be variable in capacitance diodes.

Connecting the diodes in series makes it possible to design amplifiers which are structurally and operationally considerably simpler than otherwise. One such design, called a "Serpentine Line", in which the signal carrying coax line threads in and out of the pump carrying waveguide, is discussed.

An analysis is carried out to show that under certain favorable conditions (and such conditions are actually under the control of the designer) amplification of the signal can indeed take place. In fact, the expressions obtained are similar but not identical to those obtained by Heffner and Tien.

Figure 1 is a pictorial view of the amplifier and Fig. 2 is its equivalent circuit.

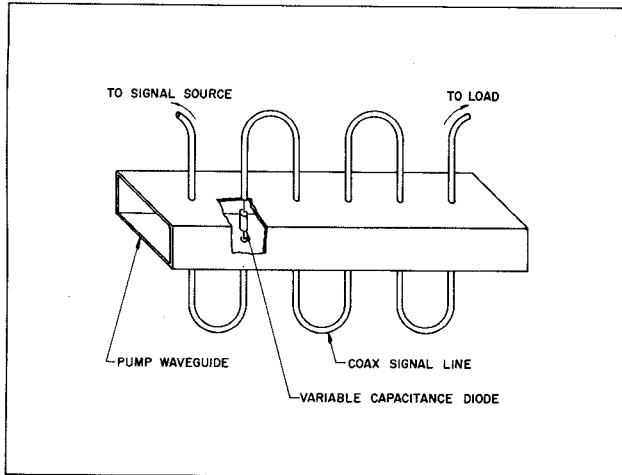


Figure 1 - Serpentine Traveling Wave Parametric Amplifier

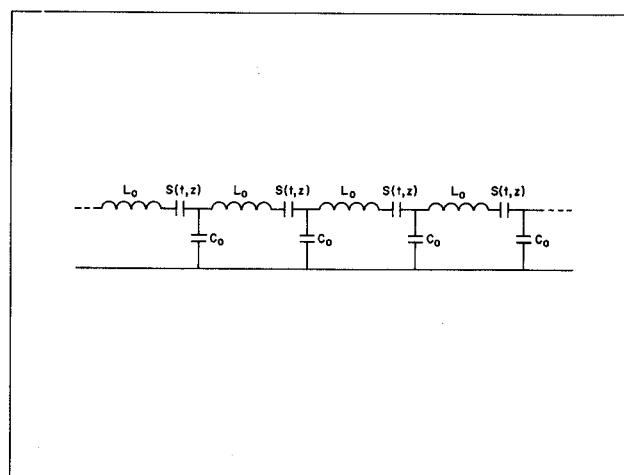


Figure 2 - Signal Line