Abstracts

Stabilization of the Gain versus Frequency Characteristics of Parametric Amplifiers at High Input Signal Levels

H.E. Brenner. "Stabilization of the Gain versus Frequency Characteristics of Parametric Amplifiers at High Input Signal Levels." 1967 Transactions on Microwave Theory and Techniques 15.5 (May 1967 [T-MTT]): 290-294.

Decreasing the negative bias voltage of varactor diodes in a parametric amplifier causes the gain versus frequency characteristic of the amplifier to shift to the higher-frequency side, resulting in a so-called "positive slope" at the signal center frequency. The same happens when the pump power is increased or when the signal power is increased, but in the latter case only when the idler circuit load resistance is below a certain value. The slope of the gain characteristic can be partially or completely compensated by detuning the signal-circuit characteristic relative to the gain versus frequency characteristic in such a way that the latter is located on a certain point of the left or right slope of the signal-circuit characteristic, or by resistive loading of the idler circuit. Complete cancellation was achieved in the range from -30 to -20 dBm signal input power by using both methods simultaneously on a practical model of a parametric amplifier operating at a signal center frequency of 3.95 GHz and a pump frequency of 11.76 GHz. The loading of the idler circuit was done by drawing a little rectified diode current. The necessary increase in pump power, in order to maintain the same gain as with both signal and idler circuits tuned to resonance, was less than 3 dB, the increase in noise figure a few tenths of 1 dB from a typical value of approximately 3 dB.

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