Abstracts

Power Waves and the Scattering Matrix

K. Kurokawa. "Power Waves and the Scattering Matrix." 1965 Transactions on Microwave Theory and Techniques 13.2 (Mar. 1965 [T-MTT]): 194-202.

This paper discusses the physical meaning and prop-erties of the waves defined by [Equation], [Equation] where V/sub i/, and Z/sub i/, are the voltage at and the current flowing into the ith port of a junction and Z/sub i/, is the impedance of the circuit connected to the ith port. The square of the magnitude of these waves is directly related to the exchangeable power of a source and the reflected power. For this reason, in this paper, they are called the power waves. For certain applications where the power relations are of main concern, the power waves are more suitable quantities than the conventional traveling waves. The lossless and reciprocal conditions as well as the frequency characteristics of the scattering matrix are presented. Then, the formula is given for a new scattering matrix when the Z/sub i/'s are changed. As an application, the condition under which an amplifier can be matched simultaneously at both input and output ports as well as the condition for the network to be unconditionally stable are given in terms of the scattering matrix components. Also a brief comparison is made between the traveling waves and the power waves.

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