Abstracts

Power-Flow Relations in Lossless Nonlinear Media

H.A. Haus. "Power-Flow Relations in Lossless Nonlinear Media." 1958 Transactions on Microwave Theory and Techniques 6.3 (Jul. 1958 [T-MTT]): 317-324.

The Manley-Rowe relations, originally derived for nonlinear lumped circuit elements, are generalized to include the power flow in the fields produced in the presence of lossless, nonlinear media. The generalization is carried out first for nonlinear anisotropic media with single-valued relations between the instantaneous /bar E/ and /bar P/, and /bar H/ and /bar M/. The proof is extended to include gyromagnetic media under small-signal excitation at the signal frequency (but large excitation at the pump frequency). The relations are applied to show under what conditions power gain can be achieved with a three-frequency and a four-frequency excitation of a ferrite. The form of the coupling coefficients in the electromagnetic operation of a ferrite amplifier is shown to be a consequence of the generalized Manley-Rowe relations.

❑ Return to main document.