Abstracts

Relationship between group delay and stored energy in microwave filters

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In this paper, an expression for the time average stored energy (t.a.s.e.) in a passive lossless two-port is derived in terms of its scattering parameters. In particular, it is shown that the t.a.s.e. in a passive lossless reciprocal symmetrical or antimetrical two-port is proportional to the group delay. One implication of this result is that the t.a.s.e., which is linked to the power-handling capability in many passive filters used in practice, is proportional to the group delay of the filter. This rigorous derivation is based on a variational theorem, which has been used in the past to prove energy storage results for passive lossless one-ports and periodic two-ports.

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