Abstracts

Adaptive Signal Cancellation Using a High Power, Low Loss Ferrite Vector Modulator

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The basic ferrite rotary-field phase shifter geometry can be adapted to perform the vector modulator functions of amplitude control as well as phase control in a closed-loop signal cancellation system. The control concept is easily described as a mapping between the sine and cosine drive currents and the rf insertion phase and amplitude. Adaptability is achieved by digitizing the error signal and using a microprocessor to correct angular offsets and gain compression between the "current plane" inputs and the "rf plane" outputs. In this way the closed-loop system can be made unconditionally stable, regardless of line-length differences in the sensing, reference, and error-cancelling branches. A laboratory test at X-band demonstrating 60 dB. cancellation with 30 dB. dynamic range is described. The approach is easily capable of handling hundreds of watts of peak power and several watts of average power, with a maximum amplitude output corresponding to an insertion loss on the order of one half dB. Low insertion loss plus the fact that no electron transport is involved should mean that the noise contribution of the device is very low.

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