Abstracts

Analysis and optimization of a phase shifter controlled by a piezoelectric transducer

This paper introduces a method for analyzing and optimizing a phase shifter controlled by a piezoelectric transducer (PET). To analyze the multilayer microstrip structure of the PET-controlled phase shifter, new equivalent single-layer (ESL) equations for the phase shift and loss calculations are developed and confirmed with spectral-domain analysis (SDA) of the moment method. A parametric analysis is accomplished with ESL equations and SDA, and optimization guidelines are suggested. An optimized PET phase shifter is demonstrated to operate up to 40 GHz with a maximum total loss of 4 dB and phase shift of 480/spl deg/. Measured results agree very well with calculations showing substantially smaller control voltage, size, and dispersion, as compared to previously published data. This new analysis and optimization technique for the PET-controlled phase shifter should be useful in the design of phased-array antennas and tunable microwave circuits.

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