Abstracts

Analysis and Design of Dispersive Interdigital Surface-Wave Transducers

W.R. Smith, H.M. Gerard and W.R. Jones. "Analysis and Design of Dispersive Interdigital Surface-Wave Transducers." 1972 Transactions on Microwave Theory and Techniques 20.7 (Jul. 1972 [T-MTT]): 458-471.

A comprehensive circuit model characterization of dispersive interdigital transducers with nonuniform electrode spacing is presented. The model is an extension of a three-port circuit which has been useful for representing periodic transducers. The extended model includes the effects of strong piezoelectric coupling whereby the acoustic waves and electric circuits interact, and it also accounts for reflections of acoustic waves which result from perturbations of the crystal surface by the metal electrodes. The inclusion of the latter effect is shown to be essential for explaining observed levels of triple-transit echos in filters and delay lines. The circuit model is used to derive a transducer design procedure which determines the electrode positions and the anodization function (acoustic aperture taper) required to reproduce a desired waveform. This procedure is applicable to the design of weighted dispersive filters and broad-band nondispersive delay lines. In order to verify the theory a low-loss octave-bandwidth nondispersive delay line was designed using linear FM dispersive transducers on YZ LiNbO/sub 3/. The performance of this device was found to be in good agreement with the circuit model predictions.

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