Abstracts

Fundamental- and Harmonic-Frequency Circuit-Model Analysis of Interdigital Transducers with Arbitrary Metallization Ratios and Polarity Sequences

W.R. Smith and W.F. Pedler. "Fundamental- and Harmonic-Frequency Circuit-Model Analysis of Interdigital Transducers with Arbitrary Metallization Ratios and Polarity Sequences." 1975 Transactions on Microwave Theory and Techniques 23.11 (Nov. 1975 [T-MTT]): 853-864.

A three-port circuit model is developed that describes the operation of interdigital transducers with arbitrary metallization ratios and electrode-polarity sequences at fundamental and higher harmonic frequencies. The electric fields that excite surface acoustic waves are found on an electrode-by-electrode basis using the approximation that the local electric fields are not influenced by electrodes more distant than the next-nearest neighbors. The resultant fields are expressed in terms of familiar functions, with a "universal" set of expansion coefficients given in Appendix II. Use of these fields in the circuit model developed earlier by other authors describes arbitrary transducers by modeling each electrode using the expansion coefficients appropriate to the local electrode environment. Illustrative results include the effective coupling coefficient of single-and double-electrode transducers of arbitrary metallization ratio for frequencies up to and including the eleventh harmonic. Also included is one example of the consequences of end effects in short transducers, and a detailed comparison of theory and experiment for transducers with a nonalternating polarity sequence [phase-reversal transducers (PRT's)].

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