QUASI-STATIC PARAMETERS OF COUPLED STRIPLINES
WITH HIGHLY UNBALANCED ELECTROMAGNETIC COUPLING

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The primary parameters of coupled striplines, having different physical lengths in the coupling region, are calculated. The calculation is carried out in the quasi-static approximation by decomposing the strip structure along two orthogonal axes, along which quasi-T-modes propagate.

Coupled striplines with unbalanced electromagnetic coupling are finding application in the construction of various microwave devices [1,2]. The inequality of the phase velocities of the normal waves in such lines enables additional functional possibilities of these devices to be realized, which are not characteristic for coupled lines with unbalanced coupling [3].

The quantitative characteristic of the unbalanced coupling is the coefficient \( k_6 = \gamma_2 / \gamma_1 \), where \( \gamma_{1,2} \) are the propagation constants of the normal waves in the coupled striplines [3]. The coefficient \( k_6 \) supplements the system of relative primary parameters consisting, in particular, of the coefficients of capacitive and inductive coupling \( k_c = C_{12}/(C_{11}C_{22}) \); \( k_L = L_{12}/(L_{11}L_{22}) \), where \( C_{ij} \) and \( L_{ij} \) are the capacitive and inductive coefficients of the matrices \( C \) and \( L \).

Coupled striplines characterized by the fact that \( k_6 \neq 1 \) usually contain a nonuniform dielectric in the transverse cross section of the striplines, which enables one to obtain \( 3 > k_6 > 0.3 \). The structure of a coupled stripline (Fig. 1) enables one to obtain an increase in the upper limit of the variation of \( k_6 \) as a result of the construction of the line. By varying the initial parameters of the construction (Fig. 1) one can solve the special problem of controlling the degree of unbalance of the coupling.

We will consider the calculation of the primary parameters of the coupled lines (Fig. 1) assuming that quasi-T-modes propagate in them [4]. In general, an interdigital line can be regarded as an n-conductor line, each strip of which is coupled to the continuous strip, which has number \( n+1 \), and is connected by crosspieces with the neighboring strips. At frequencies not exceeding 1 GHz, for a length of the neighboring strips of the interdigital line of 6-8 mm, as experimental investigations have shown, one can considerably simplify the calculation procedure without any appreciable loss in accuracy when calculating the parameters, and transfer from an \( n+1 \)-conductor system to a two-conductor

![Fig. 1](image-url)
REFERENCES


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