Finite Element Evaluation of Surface Acoustic Wave Reflection and Scattering from Topographic Irregularities Comparable with the Wavelength

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Abstract: Design of SAW devices needs the accurate study of the scattering fields, arising from the interaction of SAW with topographic irregularities. To solve this problem FE methods very perspective, because with its help one can take into account the actual geometry of the electrodes and reflectors. This work describes results of original time domain calculation of 2D SAW scattering fields in delay line made on 128° YX LiNbO₃ substrate. Reflection, transmission and scattering coefficients are numerically evaluated as functions of the reflector’s thickness. Calculations of SAW scattering field’s picture clearly show that the intense SAW energy scattering into volume occurs for certain parameters of the reflectors, while for some other configuration SAW pass through irregularities practically without scattering.

Model:

![Model Image]

Results:

![Results Image]

Conclusions:

• Calculations of two-dimensional picture of SAW scattering fields clearly show that the intense SAW energy scattering into volume occurs for certain parameters of the reflectors
• while for some other their configuration a SAW beam can pass through topographic irregularities practically without scattering.
• This method should be applied for further detailed analysis of reflective structures to synthesize properly the modern SAW tags.

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