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B-6-11 REFLECTION of GULYAEV-BLEUSTEIN and RAYLEIGH WAVES from RECTANGULAR and CURVED ENDS of the CRYSTALS

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The reflection of Gulyaev-Bleustein and Rayleigh waves from the end of the crystalline sample was investigated experimentally. Both types of surface waves propagated along the same directions.

We have studied two cases: the reflection of the wave a) from the rectangular end and b) from the curved end, when the curvature was made between two plane surfaces of the sample and had a large radius compared with wavelength. The research was carried out by means of two method based upon the measurements of mechanical and electrical energy of the wave respectively. We used acoustoelectric probe, silicon probe and piezo-semiconductor transducers in our experiments.

In the first case the Rayleigh wave reflection loss was about 6dB and the Gulyaev-Bleustein wave reflection loss was only 1 - 2 dB. These losses didn't depend on the frequency in the range of 10 ÷ 110 MHz.

In the second case there were no absorbtion of Rayleigh wave. Thus we conclude that there wasn't noticeable Rayleigh wave transformation in leaky surface wave in rotated cuts of $Bi_{12}GeO_{20}$ and CdS under consideration.

The amplitude of the Gulyaev-Bleustein wave oscillated after the wave passing the curved ends. These oscillations couldn't be explained as in the case of the Rayleigh wave passing the curved end which had small radius. To optimize the Gulyaev-Bleustein wave passing the ends it was necessary to choose the frequency. These results can be explained in the following way. Viktorov showed that the Gulyaev-Bleustein wave propagates along cylindrical surface with mode conversion. Therefore, we supposed that on curved ends the Gulyaev-Bleustein wave consists of different modes which interfere with each other. We think that it is this interference which leads to the oscillations observed.

Finally, we showed that the Gulyaev-Bleustein wave could circulate around the periphery of the sample which has curved ends. Four round-trip transits could have been visible on the oscilloscope at discrete frequencies in the range of 25-55 MHz, representing a total time delay of 190 μs.

The acoustoelectric amplification allowed us to get the maximum delay time in the broader frequency range (namely in the range of 20-70 MHz) than it was possible without amplification (25-55 MHz). It also compensated the propagation losses particularly. The resolution of the different output signals was achieved by means of selective amplification.

Thus we showed the possibility of wrap-around delay line based on Gulyaev-Bleustein wave. The device had a narrow bandwidth ($\sim$1 MHz) at the frequencies used (up to 100 MHz). Nevertheless the Gulyaev-Bleustein wave advantages at very high frequencies, make this wave appropriate for the applications in wrap-around delay lines.