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Transformation of Acoustic Modes in Case of Arbitrary Reflection
in Acousto-Optic Crystals

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The phenomenon of unusual reflection of plane elastic waves is examined in the crystalline compounds of tellurium and mercury. It is predicted and registered in experiments that energy flow of one of the reflected waves may propagate practically in a back direction with respect to an incident energy flow. This phenomenon is observed in the materials with a strong anisotropy of elastic properties. In the case of inclined incidence, the reflection may take place strictly in back direction with respect to the intrinsic energy flow. Moreover, all incident elastic energy may be reflected in a form of a back elastic wave. The analysis was carried out for all existing cases of inclined incidence in the crystals. It was proved that relative intensity of the unusually reflected wave might be close to a unit in a wide variety of incidence and cut angles in the crystals. A comparative analysis of the effect in new anisotropic materials and in the well-known crystals has been carried out. Since the crystals under investigation possess relatively high magnitudes of acousto-optic figure of merit, e.g. paratellurite and calomel, principal results of the research are of significance in development of new generations of acousto-optic devices.