

New Technology for Investigations of Photoelastic Properties of Nontransparent Crystals

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As is well known an acousto-optical interaction is lacking in absolutely transparent crystals. In this connections greatest interest are presented acousto-optical investigations in the optical range, in what the crystal is not transparent. In order to carry out similar experiments, it is necessary to use the crystal with a small light absorption coefficient, for instance 10^{-2} cm^{-1} at applied wavelength. Evidently, the geometry of experiment will be different from that for transparent crystal because the crystal thick a few millimeters will absorb the incident light completely. The main problem is selection of appropriate buffer crystal for the investigated crystal so that the light beam penetrated into sample by Bragg angle at required wavelength. The refractive index of a transparent buffer sample must be near to refractive index of the nontransparent investigated crystal.

In present work the measurements of effective photoelastic constant have been done for Si crystal, which is not transparent at wavelength 632.8 nm. The crystal of Lithium Niobate (LiNbO_3) was used as the buffer crystal because its refractive index ($n=2.28$) is not far from that for Si crystal. The results of measurements were showed a good coincidence of obtained results with literary data. At that rate, the very high intensity of scattered light can be obtained in comparison with that in transparent crystals.

As a whole, the investigations have confirmed the efficiency of the offered new technology for determination of photoelastic properties of nontransparent crystals.