11.1–21 THE USE OF COMPUTER EXPERIMENTS FOR THE STUDY OF DISLOCATION IMAGE FEATURES ON SECTION TOPOGRAPHS.

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It is now well established that simulated images of defects on X-ray section topographs, computed by solving TAKAGI-TAUPIN equations, agree very well with experimental ones (see, for instance, A.Authier, M.Lefeld-Sosnowska, Y.Epelboin et A.Soyer, this conference). The use of color displays enables to enhance strikingly small contrast differences which would not be observed on black and white displays. Computer experiments which take a few minutes provide therefore a very useful tool for the study of the variations of the various features of the image with all of the many parameters it depends on, such as the geometrical parameters of the dislocation and of the crystal and the diffraction conditions, while it would simply not be possible in practice to consider experimentally all the corresponding situations. By means of computer simulations, it is therefore possible to predict the various types of dislocation images to be expected. This is illustrated in the present paper with a few examples.

A systematic study is presented of the variation of the image contrast with total crystal thickness and absorption, which enables the various components of the image to be separated. In particular, the intermediate image which is not clearly identified and separated from the direct image in a thin crystal for certain orientations become clearly visible when crystal thickness is increased. A wide range of dislocation orientations has been studied showing the difference in the general nature of the image depending on whether the orientation of the dislocation lies within or outside the BORRMANN fan.

The sign of the BURGERS vector affects primarily the intermediate image but also the KATO fringes far from the line. Therefore, for thin crystals for which the intermediate image is not important, very small differences in contrast only are to be observed when changing the sigh of $\vec{h}.\vec{b}$. The KATO fringes are simply slightly more or less intense on each side of the line and this is reversed when changing the sign of $\vec{h}.\vec{b}$. This effect is hardly visible on black and white display but can be made artificially very visible on color displays. For the same geometry of the dislocation but thicker crystals, however, the presence of the intermediate image is at the origin of the bigger difference in the constrasts computed for opposite signs of the BURGERS vector and makes easier to determine the BURGERS vector of an experimental dislocation by comparison with simulated ones as has been shown in a particular case by Y. EPELBOIN (J. Appl. Cryst., 7, 372, 1974).

11.1–22 EXPERIMENTAL AND COMPUTER SIMULATION STUDY OF THE VARIATION WITH DEPTH OF DISLOCATION IMAGES IN SECTION TOPOGRAPHS.

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A systematic study of the variations of the contrast of a dislocation line in silicon on section topographs with the depth of the line was performed both experimentally and with computer simulations for orientations of the dislocation with its BURGERS vector ranging between 60° and 90° in the glide plane. It showed that when the dislocation lies close to the entrance surface, whatever its orientation, its image is centered around the trace of the plane of incidence passing through the intersection of the dislocation with the direct beam while when the dislocation lies close to the exit surface its image is centered around the projection of the dislocation on the section pattern. The variation of the orientation of the image for intermediate thicknesses can be interpreted in terms of the calculated orientation of the dynamical image. The various features of the image include a concentration of intensity along the projection of the dislocation in the reflected direction. Slit width has been taken into account in the simulations for a better fit with experimental topographs. Variation of the contrast with the sign of the BURGERS vector is studied in a separate paper (A.Authier in this conference).

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11.1–23 THREE DIMENSIONAL REPRESENTATION OF GROWTH DEFECTS IN GGG CRYSTALS.

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During the growth process of GGG crystals by Czochralski method disturbances sometimes occur which cause crystal growth in the shape of a single or multiple spiral instead of a cylinder.Moreover we can observe growth bands and facetting regions.To obtain the presentation of the three dimensional distribution of growth bands and facets a rectangular (111 , $(\bar{1}\bar{1}\bar{1})$, $(1\bar{1}0)$, $(\bar{1}10)$, $(11\bar{2})$ and $(\bar{1}\bar{1}2)$ surfaced specimen of 24x12x8 mm^3 has been cut out from a spiral GGG crystals.Double crystal topography using CuKα and MoKα radiation was used.The topograms obtained have been sticked to the corresponding faces of the rectangular model of the GGG specimen being under study / see Fig./.The details of the analysis will be presented.