Some Features of X-ray Diffraction in Monocrystals in Presence of the Temperature Gradient

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At defined external parameters of the influences (temperature gradient (TG), acoustic vibrations) and for reflecting atomic planes(10 $\bar{1}$1) of the quartz, the X-ray complete pumping process occurs from transmission to the diffraction direction [1]. In work [2] it is also shown that the change of the crystal-medium heat exchange the complete pumping conditions is varying.

For prove the obtained experimental results, the heat conductivity equation with boundary conditions of the experiment was solved. The obtained temperature field in the crystal gives picture about distortion field inside the crystal. Afterward the Takagi equations were solved for given distortion field. It is obtained that with TG growth the intensity of the diffracted reflected radiation is increasing up to the saturation (intensity of the diffracted transmitted radiation decreased until zero). With the further TG growth the intensity is decreasing and the rocking curve is continuing monotonically expand. From the theoretical analysis obtained that in case increase of the crystal-medium heat transfer the corresponding TG which is satisfying to the X-ray complete pumping condition is decreases. The obtained theoretical results are in good agreement with the experimental results.

[1] Mkrtchyan A.R., Navasardyan M.A., Mirzoyan V.K., *Pisma w ZhTF*, 1982, **8**, 677. [2] Kocharyan V.R., Movsisyan A.E., *"X-Ray Optics-2004"*, Annual Workshop, N.Novgorod, 2-6 May 2004.