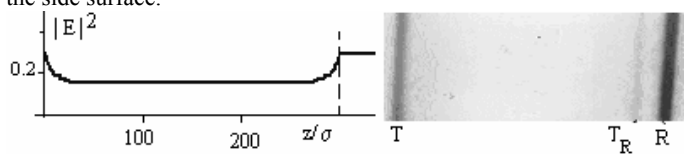


Electromagnetic Wave Tunneling Through a Barrier With Periodical Structure

M.A. Navasardyan, A.H. Gevorgyan, *Yerevan State University, A.Manookian Str 1, Yerevan, Armenia, 375025.* E-mail: agevorgyan@ysu.am; nmarut@ysu.am

We discuss specific features of electromagnetic wave localization inside specimen with periodical structure in diffraction regime. The problem was solved by Hambartsumian's layer addition method modified for cholesteric liquid crystal layer (CLCL)[1]. Experiment for a perfect single crystal of silicon was fulfilled when x-ray beam was reflected from atomic planes ($2\bar{2}0$). We reveal an interesting manifestation of electromagnetic wave tunneling through barrier with periodical structure, namely, we theoretically and experimentally showed that when electromagnetic wave propagated through the barrier in the Bragg regime the wave field in the specimen was localized near the specimen boundaries, while it was practically absent inside the sample. Using this we explained the fact (observed in experiment) that absorption and scattering inside the sample are practically absent, and that reflection takes place only from the two surface layers of the sample. Fig. 1 shows electromagnetic wave intensity distribution in CLCL in the Bragg diffraction regime (a) and x-ray sectional photograph from the two block silicon systems, when the primary beam (which is reflected from the first block and incident onto the second block) then forms three beams; R is reflected from the entrance surface, T is the transmitted beam and T_R is reflected from the side surface.



[1] Gevorgyan A.H., et al., *Opt. Spectrosc.*, 2000, **88**, 647.

Keywords: diffraction, tunneling, surface physics