interferometric studies on natureal and induced birefringence

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1- In this work a simple and accurate interferometric method for measuringthe natural birefringence and its dispersion across the visible region ofspectrum is presented.2- Although the theoretical and experimental background of the method isnearly known, the fields of application and data processing approach arefirstly presented. The method is applicable for liquid and solid samplesof fixed thickness all over the slit ofthe spectrograph.3- A two- term Cauchy dispersion function is most suitable to giveaccurate values of the birefringence dispersion, because it is simple andtime saving.4- The measured birefringence for both a transparent photographic filmand mica sheet decreases with increasing wavelength.S- The natural birefringence L'in for an anisotropic material is alsoevaluated for cellophane sheet by changing its thickness, which isanother simple method for obtaining birefringence for anisorropicmaterials.6- The distribution of the fringes makes it possible to assess thedistribution of the stresses inside the plate. This underlies the opticalmethod of studying stresses (photoelastic stress analysis). A modelmade from a transparent isotropic material is placed between crossedpolarizers. The model is subjected to the action of loads similar tothose, which the article itself wil1 experience. The pattern observed intransmitted white light makes it possible to determine the distributionof the strain and also to estimate its magnitude.7- The induced birefringence produced by a certain stress on an isotropicmaterial decreases by increasing wavelength and Cauchy's dispersionfunction is achieved. The dispersion increases by increasing appliedstress upon the sample.8- from the relation between the applied stress and the resulting strain,which is built upon the displacement in the fringe, Young's modulusis evaluated by a simple and accurate method.9- The stress optical coefficient is obtained, with different wavelengths,from the relation between the induced birefringence and the appliedstress. The stress optical coefficient depends on the wavelength of thelight and the material used.10- The bending ofa birefringent plate (Fortepan photographic plate isused in our experiment) introduces additional birefringence. Theinduced birefringence bon increases by decreasing radius of curvature(i.e., by increasing the applied stress causing curvature.) and thenumber of fringes increases and crowds around the center. The naturalbirefringence for a Fortepan photographic plate is obtained at infinityvalue for the radius of curvature.