laser interferometic investigation for some environment

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In the present work we are interested in measuring the refractive indexof some environmental pollutant gases [carbon dioxide anddichlorodifluoromethane (freon 2) gases].The measurements carried out at different pressures from 60 to 90 emHg and temperatures rang from 308 to 358 k.A Mach-Zehnder interferometer illuminated with Argon laser at 488 nm(6.15 Xl014 Hz) is used for measuring the value of the refractive index and it’svariation with pressure and temperature.The method is based on the shift of the interference fringes patterncaused by the change of the pressure (density) at constant temperature.By using cauchy’s equation, the relation between the refractive indexand the wavelength are determined and we can get the optical dispersioncurves for carbon dioxide and freon 12 gases.Also, from the relationship between the refractive index and opticalpremettivity (n2=c), and by applying Clausius-Mosotti equation we calculatedsome of the physical parameters such as dielectric susceptibility, specificrefractivity, polarizability, radius of the molecule, pressure coefficient, andthermo-optical coefficient. Moreover by using the radius of the molecules forCO2 gas we calculated the transport coefficients (diffusion coefficient,viscosity coefficient, and the thermal conductivity coefficient) at differentpressure and temperature.The thesis includes four chapters;In the first chapter, we describe the main dielectric properties of gases,the transport coefficients of gases, and the optical dispersion.In the second chapter, we describe the interference phenomena -and thetypes of interference (multiple beam interference like Fabry -Perotinterferometer and two-beam interference like Jamin and Mach Zehnderinterferometers). Also the advantages and disadvantages andwhy we usedMach-Zehnder interferometer in this work.In the third chapter, we discuss the experimental technique and the mainapparatus constructed by us for measuring the refractive indices of the twoenvironmental pollutant gases and their variation with pressure andtemperature.In the fourth chapter, we introduce the experimental results for the twogases (carbon dioxide and freon 12).The obtained results given in this thesis should be used as a literaturereferences for helping the researchers in the field of the optical and thermalphysics.