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Self - Focusing of Visible Light in CS_2 Liquid

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ABSTRACT : Using a low power visible He-Ne laser we report on the observation of self focusing, . Filamentationh , aberration, and scattering in liquid carbon disulfide (CS_2) .

1. INTRODUCTION

Among the non - linear optical effects that have been intensely investigated both theoretically and experimentally during the first twenty years after the advent of laser a special position is occupied by effects of self - action of powerful light waves. Self- action effects are connected with dependence of the complex dielectric constant (complex refractive index) on the intensity of the propagating wave. Almost the non - linear optical effects are connected with interaction of a strong light field with liquid that causes or leads to orientation of the anisotropically polarized molecules. In this article we have carried out an experiment using very low power visible light field.

Self-focusing of laser radiation in CS_2 have been observed by many investigators using various techniques [1-8]. We in this article are reporting on the observation of self focusing action , filamentations and scattering effects in CS_2 liquid using a visible low power 6328 A^o beam from a conventional He - Ne laser.

The self focusing process: The self focusing effect of a laser beam can be readily understood in the approximations of geometrical optics [2]. For liquids , the refractive index usually increases with intensity. Because of the non uniform intensity distribution inherent with a beam of finite cross section (since the spatial intensity destribution have a Gaussian shape profile given by $I = I_o \exp(-2r^2 / w^2)$ where I is the beam intensity , r is the transverse coordinate.