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# Automatic refractive index profiling of fibers by phase analysis method using Fourier transform

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## Abstract

Automatic fringe pattern analysis is a powerful and inexpensive digital image-processing technique. It is used to analyze the fringe pattern obtained by different optical techniques, such as multiple-beam Fizeau fringes. To perform accurate and fast automatic measurement of fiber refractive index profile, phase analysis method has been used with the Fourier transform technique. In this paper, the refractive index profiles of polyethylene fibers with different draw ratios are presented by two methods, fringe shift method and phase analysis method. A comparison between the results obtained is presented. © 2002 Elsevier Science Ltd. All rights reserved.

*Keywords:* Automatic fringe analysis; Fourier transform; Phase measurement; Multiple-beam Fizeau fringes; Refractive index profile; Polyethylene fiber

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## 1. Introduction

In the present decade, much progress has been made in the field of optical measurement because of several major advances in its related technologies. Optical measurement is based on the wave characteristics of light when it reflects from or transmits through an object. Light transmission properties through a fiber depend mainly on its refractive index profile and material dispersion. The refractive index

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