

Accepted Manuscript

Title: Optical solitons in multiple-core couplers with the nearest neighbors linear coupling

Author: Maysaa Mohamed Al Qurashi Esmat Ates Mustafa Inc

PII: S0030-4026(17)30661-7
DOI: <http://dx.doi.org/doi:10.1016/j.ijleo.2017.06.002>
Reference: IJLEO 59263



To appear in:

Received date: 13-3-2017
Revised date: 31-5-2017
Accepted date: 1-6-2017

Please cite this article as: Maysaa Mohamed Al Qurashi, Esmat Ates, Mustafa Inc, Optical solitons in multiple-core couplers with the nearest neighbors linear coupling, *Optik - International Journal for Light and Electron Optics* (2017), <http://dx.doi.org/10.1016/j.ijleo.2017.06.002>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Optical solitons in multiple-core couplers with the nearest neighbors linear coupling

¹Maysaa Mohamed Al Qurashi, ²Esma Ates, ³Mustafa Inc

¹Department of Mathematics, King Saud University, Riyadh, Saudi Arabia

²Department of Electronics and Communication Engineering, Of Technology Faculty, Karadeniz Technical University, 61080

Trabzon/Turkiye

³Department of Mathematics, Science Faculty, Firat University, 23119

Elazığ/Turkiye

E-mails: maysaa@ksu.edu.sa, esmaates@ktu.edu.tr, minc@firat.edu.tr

Abstract: This paper addresses a type of nonlinear directional optical couplers with four different forms, namely the Kerr law, power law, parabolic law and dual-power law. The multiple-core couplers with the nearest neighbors linear coupling is studied with four forms of nonlinearity. Bright and dark optical solitons are obtained as well as Jacobi elliptic function solutions. The constraint conditions are acquired for the existence of solitons.

Keywords: Optical solitons, optical couplers, Jacobi elliptic functions.

1 Introduction

The dynamics of solitons in nonlinear directional couplers has been studied recently in the context of nonlinear optics. Nonlinear optical couplers are very useful devices that distribute light from a main fiber into one or more branch fibers. Couplers also have applications as intensity-dependent switches and as limiters.

The nonlinear Schrödinger's equation (NLSE) is the main governing model for the propagation solitons through optical fibers. There are several results and many new ideas about this equation for optical solitons [1]-[31]. We consider the NLSE with spatio-temporal dispersion (STD) and group velocity dispersion (GVD) in the case of optical couplers in this work. We study multiple-core couplers which is a type of nonlinear directional optical couplers with four forms of nonlinearity. The nonlinearities that are considered in this paper are the Kerr law, power law, parabolic law and dual-power law. The Jacobi elliptic functions are used to get exact solutions of this equation. We have studied earlier twin-core couplers which is another type of nonlinear directional optical couplers in [6].

Download English Version:

<https://daneshyari.com/en/article/5025178>

Download Persian Version:

<https://daneshyari.com/article/5025178>

[Daneshyari.com](https://daneshyari.com)