

Accepted Manuscript

Spatial solitons in PT symmetric potential with competing gain and loss

Chunfu Huang

PII: S0003-4916(17)30039-8

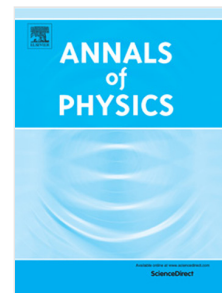
DOI: <http://dx.doi.org/10.1016/j.aop.2017.01.027>

Reference: YAPHY 67325

To appear in: *Annals of Physics*

Received date: 27 September 2016

Accepted date: 26 January 2017



Please cite this article as: C. Huang, Spatial solitons in PT symmetric potential with competing gain and loss, *Annals of Physics* (2017), <http://dx.doi.org/10.1016/j.aop.2017.01.027>

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.

Spatial solitons in PT symmetric potential with competing gain and loss

Chunfu Huang^{*}

College of Physics and Material Science, Tianjin Normal University, Tianjin 300387, China

Abstract: The existence and stability of fundamental, dipole and tripole solitons are investigated in parity-time symmetric potential with competing gain and loss. The competing parameter decide both the width of potential and loss or gain region. All these solitons exist in the potential with a suitable width. It is easy to form a fundamental soliton when increased the parameter k . While to form a dipole and tripole soliton, the value of k should locate in some region. These solitons are unstable for a larger power while may be stable for a relatively small one. The effects of competing gain or loss profile on the stability of these solitons are investigated with a linear stability analysis corroborated by a beam propagation method.

Keywords: Optical Solitons; PT symmetry; Propagation; Stability;

PACS numbers: 42.65.Tg; 42.65.Wi; 42.65.Bs; 11.30.Er.

1. Introduction

Recently, Bender et al. investigated non-Hermitian Hamiltonians and found that many of them have entirely real spectrum provided that have the so-called Parity-Time (PT) symmetry property^[1]. A necessary condition for the Hamiltonians to be PT symmetry is that the potential function $V_{PT}(X) = V(X) + iW(X)$ should satisfy the condition $V_{PT}^*(X) = V_{PT}^*(-X)$ ^[2-4]. In optics the complex refractive index plays the role of a PT symmetric potential such that $V(X)$ is an even function of position and $W(X)$ is an odd function. Since then, propagation of optical beam in complex nonlinear media featuring the PT symmetry has drawn considerable attention^[5-18]. Spatial solitons would form when the optical beams diffraction is balanced by the nonlinearity or optical potentials. Solitons may exhibit two regions: one region soliton propagate stably where the other soliton propagate unstably. Lots of investigation on the existence of various types of solitons in PT

^{*}Email: chunfuhuang@126.com

Download English Version:

<https://daneshyari.com/en/article/5495963>

Download Persian Version:

<https://daneshyari.com/article/5495963>

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