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SOLITARY WAVE PROSPECTS OF METAMATERIALS

NCSM-20

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ABSTRACT

Modern day researchers have developed artificially structured material composites, called 'metamaterials' that possess significant potential to provide electromagnetic properties that are quite unusual and are not found in nature. This article is aimed at giving an introductory review of this class of 'designer materials' and a study on the switching dynamics of solitary waves through fiber made of metamaterial core.

Keywords: metamaterial, Negative refractive index material, optical fiber, soliton solution, dispersion nonlinearity.

INTRODUCTION

Metamaterial, the promising avenue of intense and widespread interest, are artificially constructed structures exhibiting unconventional characteristics that have never been observed in nature before. The pioneering demonstration of the very important property of negative index behavior was carried out in metamaterials made with split ring resonators (SRRs) and wire structures in the microwave frequencies [1]. Armed with new nanofabrication techniques, researchers could artificially engineer sub wavelength structures and push up the operation frequency range of NIMs to THz and optical frequencies. The path attaining negative-index behaviour from far-, mid-, near-infrared, to visible wavelengths saw many theoretical predictions followed by the engineering of a variety of metamaterial structures worldwide [2-7]. An array of metallic, subwavelength elements embedded in a homogeneous host material simulating electric and magnetic dipoles to attain the negative refractive index response is the basic principle.