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Author: Houria Triki Anjan Biswas Seithuti P. Moshokoa  
Milivoj Belic



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# DIPOLE SOLITONS IN OPTICAL METAMATERIALS WITH KERR LAW NONLINEARITY

Houria Triki <sup>1</sup>, Anjan Biswas <sup>2,3</sup>,  
Seithuti P. Moshokoa <sup>2</sup> & Milivoj Belic <sup>4</sup>

<sup>1</sup> Radiation Physics Laboratory, Department of Physics,  
Faculty of Sciences, Badji Mokhtar University,  
P.O. Box 12, 23000 Annaba, Algeria

<sup>2</sup> Department of Mathematics and Statistics,  
Tshwane University of Technology, Pretoria-0008, South Africa

<sup>3</sup> Department of Mathematics, Faculty of Science,  
King Abdulaziz University, Jeddah-80203, Saudi Arabia

<sup>4</sup> Science Program, Texas A & M University at Qatar,  
PO Box 23874, Doha, Qatar

## Abstract

We investigate a higher-order nonlinear Schrödinger equation including the intermodal dispersion, self-steepening, delayed nonlinear response effect, and different contributions to the nonlinear dispersion. The model describes ultra-short (femtosecond) optical soliton propagation in metamaterials with Kerr law nonlinearity. By adopting a complex amplitude ansatz composed of the product of bright and dark solitary waves, we present exact dipole soliton solution for the model under certain parametric conditions. This type of soliton pulses characteristically exists due to a balance among nonlinear dispersion effects of different nature. Numerical results and discussions are also presented.

**Keywords:** solitons; metamaterials; numerics.

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