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NOVEL SINGULAR SOLITONS IN OPTICAL METAMATERIALS FOR SELF-STEEPENING EFFECT

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Abstract

We consider the evolution of ultrashort pulses in metamaterials wherein the pulse propagation is governed by the generalized nonlinear Schrödinger equation with higher-order effects such as pseudo-quintic nonlinearity and self-steepening effect. We present three new types of exact singular soliton-like solutions for the model in the presence of the self-steepening term, whose phase chirping varies as a function of the pulse intensity. The obtained results indicate that the parameters of solutions are directly related the self-steepening parameter. Parametric conditions on physical parameters for the existence of the novel structures are also presented. Particular cases are discussed.

OCIS Codes: 060.2310; 060.4510; 060.5530; 190.3270; 190.4370

Key words: singular solitons; metamaterials; self-steepening.

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