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Soliton interaction of a generalized nonlinear Schrödinger equation in an optical fiber.
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Summary: Under investigation in this work is a generalized nonlinear Schrödinger (NLS) equation with high-order dispersion and quintic nonlinear terms, which can describe a subpicosecond pulse propagation in optical fibers. By developing Hirota method, the bilinear form and analytical one- and two-soliton solutions are derived. Based on the analytical solutions, we give the corresponding soliton patterns to analyse dynamics of the pulse solitons. It shows that high order dispersion term may change the periodicity of propagation. The interaction of two pulse solitons is an elastic collision. By choosing suitable parameter values, we can obtain the two parallel solitons. It can be applied to improve transmission quality and capacity of information in optical fiber.

MSC:

78A60 Lasers, masers, optical bistability, nonlinear optics
35Q55 NLS equations (nonlinear Schrödinger equations)
35Q41 Time-dependent Schrödinger equations and Dirac equations
35C08 Soliton solutions

Keywords:

generalized nonlinear Schrödinger equation; Hirota bilinear method; soliton interaction

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