Combined solitons in generalized coupled mode equations of a nonlinear optical Bragg grating

Husin Alatas*
Theoretical Physics Division, Department of Physics, Bogor Agricultural University, Jl. Meranti, Gedung Wing S, Kampus IPB Darmaga, Bogor 16680, Jawa Barat, Indonesia

Received 19 February 2007; published 1 August 2007

Abstract

We discuss the existence of combined dark and antidark soliton forms or combined solitons in the generalized coupled mode equations of a nonlinear optical Bragg grating. These solitons are not allowed in the conventional coupled mode equations with uniform nonlinearity and exist outside the linear grating band gap. Their related Hamiltonian phase portrait was briefly reported by de Sterke *et al.* [Phys. Rev. E **54**, 1969 (1996)]. The explicit expressions for the corresponding solitons are presented, as well as their bifurcation process. We demonstrate the unstable propagation of perturbed combined solitons with zero velocity by means of direct numerical integration.