Dark solitons in dual-core waveguides with dispersive coupling

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Abstract:

We report on new types of two-component one-dimensional dark solitons in a model of a dual-core waveguide with normal group-velocity dispersion and Kerr nonlinearity in both cores. The coupling between the waveguides is considered to be dispersive. We found that quiescent dark solitons supported by the zero-frequency background are always gray, being stable with the out-of-phase background, i.e., for opposite signs of the fields in the cores. On the contrary, the background with a nonzero frequency supports quiescent black solitons which may be stable for both out- and in-phase backgrounds, if the dispersive coupling is sufficiently strong. Only dark solitons supported by the out-of-phase background admit an extension to the case of nonzero phase mismatch between the cores.

References:

1. Y. V. Kartashov, V. V. Konotop, and B. A. Malomed Opt. Lett., 40, 41264129 (2015).