Bright solitons from defocusing nonlinearities

Conference by professor

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Abstract:

The talk aims to give a review of recently obtained results which demonstrate that defocusing cubic media with spatially inhomogeneous nonlinearity, whose strength increases rapidly enough toward the periphery (faster than r^D in the D-dimensional space, D = 1, 2, 3, where r is the radial coordinate), can support a variety of stable solitons in all three dimensions, including one-dimensional fundamental and multihump states, twodimensional vortex solitons with arbitrary topological charges, and fundamental solitons in three dimensions. Solitons maintain their coherence in the state of motion, oscillating in the nonlinear potential as robust quasiparticles. In addition to numerically found soliton families, particular solutions are found in an exact analytical
form, and accurate approximations are developed for the entire families by means of the variational and Thomas-Fermi approximations. Related numerical and numerical results demonstrate the existence of stable dissipative solitons in media with the uniformlinear gain and nonlinear loss whose local strength grows toward the periphery faster than r^D.