Boundary induced motion of optical solitary waves

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Abstract:

Spatial solitary waves in bulk media result from a balance between the diffractive spreading of a light beam and nonlinear and/or nonlocal focusing. One particular nonlinear, nonlocal optical medium which has received much attention is a nematic liquid crystal, due in part to its large nonlinear response which allows nonlinear effects to be observed over small distances. A series of elegant experiments have shown that stable spatial solitary waves, so-called nematicons, can propagate in nematic liquid crystals.
A modulation theory is developed to describe the boundary induced motion of a nematicon in a one-dimensional cell and it is found that good agreement between the semi-analytical and numerical solutions is obtained. The role of nematicon shape and location (in relation to the cell boundaries), for the evolution of the nematicon, is discussed.