Liquid Crystal Nematicons with Angular Momentum

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Nematicons are bulk solitary waves that propagate in a nematic liquid crystal. The propagation and interaction of two spinning nematicons of different colours/wavelengths are studied in the nonlocal limit.

Using an approximate method based on suitable trial functions in an averaged Lagrangian for the two colour nematicon equations, modulation equations to describe the evolution of the nematicons are derived. These equations are extended to include the diffractive radiation shed by the nematicons as they evolve. Excellent agreement is found between solutions of the modulation equations and full numerical solutions of the nematicon equations.

For suitable boundary conditions, the two nematicons can form a bounded state in which they orbit each other. This bounded state is found to be stable to the emission of diffractive radiation. In addition, the bounded state shows walk-off due to the different diffraction coefficients for each wavelength. Interestingly, it is found that the shed diffractive radiation plays a much lesser role in the nonlocal limit than in the local limit.