

On the Hirota Bilinearization of Fokas-Lenells Equation to Obtain Bright N-Soliton Solution

Authors : Sagardeep Talukdar, Gautam Kumar Saharia, Riki Dutta, Sudipta Nandy

Abstract : In non-linear optics, the Fokas-Lenells equation (FLE) is a well-known integrable equation that describes how ultrashort pulses move across optical fiber. It admits localized wave solutions, just like any other integrable equation. We apply the Hirota bilinearization method to obtain the soliton solution of FLE. The proposed bilinearization makes use of an auxiliary function. We apply the method to FLE with a vanishing boundary condition, that is, to obtain bright soliton. We have obtained bright 1-soliton, 2-soliton solutions and propose the scheme for obtaining N-soliton solution. We have used an additional parameter which is responsible for the shift in the position of the soliton. Further analysis of the 2-soliton solution is done by asymptotic analysis. We discover that the suggested bilinearization approach, which makes use of the auxiliary function, greatly simplifies the process while still producing the desired outcome. We think that the current analysis will be helpful in understanding how FLE is used in nonlinear optics and other areas of physics.

Keywords : asymptotic analysis, fokas-lenells equation, hirota bilinearization method, soliton

Conference Title : ICNOOP 2024 : International Conference on Nonlinear Optics and Optical Physics

Conference Location : Istanbul, Türkiye

Conference Dates : February 12-13, 2024