

Biswas, Anjan; Kara, Abdul H.; Ekici, Mehmet; Zayed, Elsayed M. E.; Alzahrani, Abdullah K.; Belic, Milivoj R.

Conservation laws for solitons in magneto-optic waveguides with anti-cubic and generalized anti-cubic nonlinearities. (English) [Zbl 1475.78007](#)
Regul. Chaotic Dyn. 26, No. 4, 456-461 (2021).

Summary: This paper implements a multiplier approach to exhibit conservation laws in magneto-optic waveguides that maintain anti-cubic as well as generalized anti-cubic forms of the nonlinear refractive index. Three conservation laws are retrieved for each form of nonlinearity. They are power, linear momentum and Hamiltonian. The conserved quantities are computed from their respective densities.

MSC:

78A60 Lasers, masers, optical bistability, nonlinear optics

Keywords:

solitons; conservation law; anti-cubic

Full Text: [DOI](#)

References:

- [1] Dötsch, H.; Bahlmann, N.; Zhuromskyy, O.; Hammer, M.; Wilkens, L.; Gerhardt, R.; Hertel, P.; Popkov, A. F., Applications of Magneto-Optical Waveguides in Integrated Optics: Review, *J. Opt. Soc. Am. B*, 22, 1, 240-253 (2005) · [doi:10.1364/JOSAB.22.000240](#)
- [2] Fedele, R.; Schamel, H.; Karpman, V. I.; Shukla, P. K., Envelope Solitons of Nonlinear Schrödinger Equation with an Anti-Cubic Nonlinearity, *J. Phys. A*, 36, 4, 1169-1173 (2003) · [Zbl 1066.35091](#) · [doi:10.1088/0305-4470/36/4/322](#)
- [3] Haider, T., A Review of Magneto-Optic Effects and Its Application, *Int. J. Electromagn. Appl.*, 7, 1, 17-24 (2017)
- [4] Hasegawa, K.; Miyazaki, Y., Magneto-Optic Devices Using Interaction between Magnetostatic Surface Wave and Optical Guided Wave, *Jpn. J. Appl. Phys.*, 31, 230-233 (1992) · [doi:10.7567/JJAPS.31S1.230](#)
- [5] Kudryashov, N. A., First Integrals and General Solution of the Traveling Wave Reduction for the Schrödinger Equation with Anti-Cubic Nonlinearity, *Optik*, 185, 665-671 (2019) · [doi:10.1016/j.ijleo.2019.03.167](#)
- [6] Qiu, Y.; Malomed, B. A.; Mihalache, D.; Zhu, X.; Peng, J.; He, Y., Generation of Stable Multi-Vortex Clusters in a Dissipative Medium with Anti-Cubic Nonlinearity, *Phys. Lett. A*, 383, 228, 2579-2583 (2019) · [Zbl 1478.78063](#) · [doi:10.1016/j.physleta.2019.05.022](#)
- [7] Shoji, Y.; Mizumoto, T., Waveguide Magneto-Optical Devices for Photonics Integrated Circuits, *Opt. Mater. Express*, 8, 8, 2387-2394 (2018) · [doi:10.1364/OME.8.002387](#)
- [8] Yan, Z.; Chow, K. W.; Malomed, B. A., Exact Stationary Wave Patterns in Three Coupled Nonlinear Schrödinger/Gross - Pitaevskii Equations, *Chaos Solitons Fractals*, 42, 5, 3013-3019 (2009) · [Zbl 1198.35263](#) · [doi:10.1016/j.chaos.2009.04.043](#)
- [9] Zayed, E. M. E.; Alngar, M. E. M.; Shohib, R. M. A.; Biswas, A.; Ekici, M.; Alzahrani, A. K.; Belic, M. R., Solitons in Magneto-Optic Waveguides with Anti-Cubic Nonlinearity, *Optik*, 222 (2020) · [Zbl 1448.35092](#) · [doi:10.1016/j.ijleo.2020.165313](#)
- [10] Zayed, E. M. E.; Alngar, M. E. M.; El-Horbaty, M. M.; Asma, M.; Biswas, A.; Ekici, M.; Alzahrani, A. K.; Belic, M. R., Solitons in Magneto-Optic Waveguides with Generalized Anti-Cubic Nonlinearity, *Optik*, 223 (2020) · [Zbl 1448.35093](#) · [doi:10.1016/j.ijleo.2020.165456](#)
- [11] Kudryashov, N. A.; Safonova, D. V.; Biswas, A., Painlevé Analysis and a Solution to the Traveling Wave Reduction of the Radhakrishnan - Kundu - Lakshmanan Equation, *Regul. Chaotic Dyn.*, 24, 6, 607-614 (2019) · [Zbl 1434.78022](#) · [doi:10.1134/S1560354719060029](#)
- [12] Biswas, A.; Kara, A. H.; Zhou, Q.; Alzahrani, A. K.; Belic, M. R., Conservation Laws for Highly Dispersive Optical Solitons in Birefringent Fibers, *Regul. Chaotic Dyn.*, 25, 2, 166-177 (2020) · [Zbl 1433.78019](#) · [doi:10.1134/S1560354720020033](#)
- [13] Gonzalez-Gaxiola, O.; Biswas, A.; Asma, M.; Alzahrani, A. K., Optical Dromions and Domain Walls with the Kundu - Mukherjee - Naskar Equation by the Laplace - Adomian Decomposition Scheme, *Regul. Chaotic Dyn.*, 25, 4, 338-348 (2020) · [Zbl 1448.65291](#) · [doi:10.1134/S1560354720040036](#)
- [14] Kudryashov, N. A., Highly Dispersive Optical Solitons of an Equation with Arbitrary Refractive Index, *Regul. Chaotic Dyn.*, 25, 6, 537-543 (2020) · [doi:10.1134/S1560354720060039](#)
- [15] Kudryashov, N. A., Rational Solutions of Equations Associated with the Second Painlevé Equation, *Regul. Chaotic Dyn.*, 25, 3, 273-280 (2020) · [Zbl 1451.34004](#) · [doi:10.1134/S156035472003003X](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.