Darboux transformation of the Sasa-Satsuma equation: New solitons and resonant interaction

Tao Xu

College of Science, China University of Petroleum, Beijing 102249, China
Tel: +86-10-8973-4591, email: xutao@cup.edu.cn

Abstract:

The Sasa-Satsuma equation (SSE) is an integrable version of the higher-order nonlinear Schrödinger model which contains the third-order dispersion, self-steepening and stimulated Raman scattering terms. In this paper, we construct the N-th iterated Darboux transformation of the SSE. With the plane-wave solution as the seed, we obtain two families of "bright"-type soliton solutions on a nonzero background, and a family of resonant soliton solutions with three arms. In addition, we derive a family of rogue wave solutions with some specific value of the spectral parameter. We hope that the resonant phenomenon of bright solitons will be observed in the femtosecond fiber experiment.

References:

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