

Deformations of higher rogue Peregrine breathers and monstrous polynomials.

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Abstract:

We construct a multi-parametric family of solutions of the focusing nonlinear Schrödinger equation (NLS) equation from the known result describing the multi phase almost-periodic elementary solutions given in terms of Riemann theta functions by Its, Rybin and Salle in 1976. In particular we succeeded to find explicit analytical expressions for the P_n breathers (higher Peregrine breathers of the rank n), for $n \leq 10$ and moreover to describe explicitly quadratic polynomial deformations of P_n breathers for the ranks $n \leq 9$. As was pointed out by V.B. Matveev, the large parametric limits of the later produce P_{n-2} breathers. This was checked first by him and myself initially for the rang $n \leq 5$ and later checked also for $n = 6$ to 9 in my works. More general results concerning the large parametric limits of non-quadratic quasi-rational deformations were first found by Dubard and Matveev for $n \leq 4$ in [2]. The presented approach allows to study the generic quasi rational deformations of higher order Peregrine breathers although in [1], we discussed only the "quadratic" deformations.

References:

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2. P. Dubard and V.B. Matveev, Multi-rogue waves solutions: from NLS to KP-I equation, *Preprint RIMS-1777*, 1-39(2013)
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