

Multiscale reduction of nonlinear equations defined on a lattice

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Reductive perturbation techniques [8, 9] have proved to be important tools to find approximate solutions for many physical problems by reducing a given nonlinear partial differential equation to a simpler equation, which is often integrable[2].

Here I present and discuss few attempts to carry over this approach to partial difference equations [1, 3, 5, 4, 6]. I will show that the problem, at first introduced for function of finite order of slow-varyness, can be carried over to function of infinite order of slow-varyness. In this way one is able to obtain by multiscale reduction of the integrable lattice potential KdV equation [7] and integrable NLS equation.

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