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# Approximations of dynamics of nonlinear lattices on the extended time scale

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## Abstract

I will address two popular approximations of dynamics of nonlinear lattices. Small-amplitude slowly varying travelling waves in the Fermi-Pasta-Ulam lattices are approximated by solutions of the Korteweg-de Vries equations. Small-amplitude weakly coupled oscillators in the Klein-Gordon lattices are approximated by solutions of the discrete nonlinear Schrodinger equations. For both approximations, I will show how to justify the amplitude equations on the standard and extended time scales by using a priori energy estimates. I will also show how approximations on the extended time scale can be used to prove approximate nonlinear stability of solitary waves and breathers in nonlinear lattices.

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