Approximations of dynamics of nonlinear lattices on the extended time scale

Dmitry Pelinovsky*1

1Department of Mathematics, McMaster University – 1280 Main Street West, Hamilton, Ontario, Canada, L8S 4K1, Canada

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.