SM11S_11813

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Hidden and Driven solitons in Microstructured Media

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Wave propagation in microstructured materials is studied by making use of the Korteweg–de Vries type model equations. The first case concerns the alloy-type materials for which the nonlinearity is of the quadratic and quartic character and dispersion includes so-called cubic and quintic terms. The second case corresponds to a nonlinear microstructured layer where the driving force is of importance. It has been shown that in both cases the soliton trains may emerge. In the conservative case, the soliton train includes both visible and hidden solitons. The latters play a role in causing additional phase shifts in interaction processes, but do not play any significant role in energy sharing within the soliton train. In the nonconservative case (external driving force) hidden solitons can be amplified under certain resonance conditions. Such a phenomenon may open new possibilities for generating wave fields with designed properties that may be used in nondestructive testing.

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