Nonlinear Waves in an Inhomogeneous Fluid Filled Elastic Tube

DUAN Wen-Shan

Department of Physics, Northwest Normal University, Lanzhou 730070, China

Abstract: In a thin-walled, homogeneous, straight, long, circular, and incompressible fluid filled elastic tube, small but finite long wavelength nonlinear waves can be describe by a KdV (Korteweg de Vries) equation, while the carrier wave modulations are described by a nonlinear Schrödinger equation (NLSE). However if the elastic tube is slowly inhomogeneous, then it is found, in this paper, that the carrier wave modulations are described by an NLSE-like equation. There are soliton-like solutions for them, but the stability and instability regions for this soliton-like waves will change, depending on what kind of inhomogeneity the tube has.

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