

Interactions of Nonlinear Waves in Fluid-Filled Elastic Tubes

Hilmi Demiray

Department of Mathematics, Faculty of Arts and Science, Isik University, Büyükdere Caddesi,
34398 Maslak, Istanbul, Turkey

Reprint requests to H. D.; E-mail: demiray@isikun.edu.tr

Z. Naturforsch. **62a**, 21 – 28 (2007); received November 11, 2006

In this work, treating an artery as a prestressed thin-walled elastic tube and the blood as an inviscid fluid, the interactions of two nonlinear waves propagating in opposite directions are studied in the longwave approximation by use of the extended PLK (Poincaré-Lighthill-Kuo) perturbation method. The results show that up to $O(k^3)$, where k is the wave number, the head-on collision of two solitary waves is elastic and the solitary waves preserve their original properties after the interaction. The leading-order analytical phase shifts and the trajectories of two solitons after the collision are derived explicitly.

Key words: Elastic Tubes; Solitary Waves; Wave Interaction.