

# Odd-Soliton-Like Solutions for the Variable-Coefficient Variant Boussinesq Model in the Long Gravity Waves

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Z. Naturforsch. **65a**, 818–828 (2010); received September 7, 2009 / revised December 18, 2009

Under investigation in this paper, with symbolic computation, is a variable-coefficient variant Boussinesq (vcvB) model for the nonlinear and dispersive long gravity waves travelling in two horizontal directions with varying depth. Connection between the vcvB model and a variable-coefficient Broer-Kaup (vcBK) system is revealed under certain constraints. By means of the  $N$ -fold Darboux transformation for the vcBK system, odd-soliton-like solutions in terms of the Vandermonde-like determinant for the vcvB model are derived. Dynamics of those solutions is analyzed graphically, on the three-parallel solitonic waves, head-on collisions, double structures, and inelastic interactions. It is reported that the shapes of the soliton-like waves and separation distance between them depend on the spectrum parameters and the variable coefficients affect the velocities of the waves. Our results could be helpful in interpreting certain nonlinear wave phenomena in fluid dynamics.

*Key words:* Variable-Coefficient Variant Boussinesq Model; Odd-Soliton-Like Solutions;  $N$ -Fold Darboux Transformation; Vandermonde-Like Determinant; Symbolic Computation.

*PACS numbers:* 02.30.Ik, 02.30.Jr, 05.45.Yv