

# Dynamics of Bright Solitary-waves in a General Fifth-order Shallow Water-wave Model

Woo-Pyo Hong

Department of Physics, Catholic University of Daegu,  
Hayang, Kyongsan, Kyungbuk 712-702, South Korea

Reprint requests to W.-P. H.; E-mail: wphong@cuth.cataegu.ac.kr

Z. Naturforsch. **59a**, 257 – 265 (2004); received January 15, 2004

New analytic  $\text{sech}^2$ -type traveling solitary-wave solutions, satisfying zero background at infinity, of a general fifth-order shallow water-wave model are found and compared with previously obtained non-zero background solutions. The allowed coefficient regions for the solitary-wave solutions are classified by requiring the wave number and angular frequency to be real. Detailed numerical simulations are performed to demonstrate the stability of the solitary-waves and to show the soliton-like behavior of two interacting solitary-waves. For a large nonlinear term we show the formation of a bounded state of two solitary-waves, called *bion*, which travels as a single coherent structure. – PACS numbers: 03.40.Kf, 02.30.Jr, 47.20.Ky, 52.35.Mw

*Key words:* Fifth-order Shallow Water Wave Model; Analytic Solitary-wave Solution;  
Numerical Simulation; Stability; Interaction.