

Painlevé Integrability and N -Soliton Solution for the Whitham-Broer-Kaup Shallow Water Model Using Symbolic Computation

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Z. Naturforsch. **63a**, 253 – 260 (2008); received December 21, 2007

With the help of symbolic computation, the Whitham-Broer-Kaup shallow water model is analyzed for its integrability through the Painlevé analysis. Then, by truncating the Painlevé expansion at the constant level term with two singular manifolds, the Hirota bilinear form is obtained and the corresponding N -soliton solution with graphic analysis is also given. Furthermore, a bilinear auto-Bäcklund transformation is constructed for the Whitham-Broer-Kaup model, from which a *one*-soliton solution is presented.

Key words: Whitham-Broer-Kaup Model; N -Soliton Solution; Auto-Bäcklund Transformation; Painlevé Analysis; Bilinear Form.