

Symmetry Analysis and Solutions for a Family of BBM Equations

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We apply the Lie-group formalism [2] and the nonclassical method due to Bluman and Cole [1] to deduce symmetries of the family of BBM equations with strong nonlinear dispersive,

$$u_t + u_x + a(u^m)_x + (u^n)_{xxt} = 0, \quad (1)$$

where a is an arbitrary constant. Equation (1) was introduced in [3] to obtain exact solitary wave solutions by using an algebraic method. We make a full analysis of the symmetry reductions and we prove that the nonclassical method applied to equation (1) leads to new reductions, which can not be obtained by Lie classical symmetries. Some new exact solutions can be derived. We also have write (1) in a conserved form and new classes of non local symmetries have been obtained.

References

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- [3] Wang, L., Zhou, J. and Ren, L. The Exact SolitaryWave Solutions for a Family of BBM Equation. *International Journal of Nonlinear Science*, **1**(58-64), 2006.