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New Similarity Reductions and Compacton Solutions for Boussinesq-Like Equations with Fully Nonlinear Dispersion

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Abstract: In this paper, similarity reductions of Boussinesq-like equations with nonlinear dispersion (simply called B(m,n) equations) $u_{tt}=(u^n)_{xx}+(u^m)_{xxxx}$, which is a generalized model of Boussinesq equation $u_{tt}=(u^2)_{xx}+u_{xxxx}$ and modified Bousinesq equation $u_{tt}=(u^3)_{xx}+u_{xxxx}$, are considered by using the direct reduction method. As a result, several new types of similarity reductions are found. Based on the reduction equations and some simple transformations, we obtain the solitary wave solutions and compacton solutions (which are solitary waves with the property that after colliding with other compacton solutions, they re-emerge with the same coherent shape) of B(1,n) equations and B(m,m) equations, respectively.

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