New Soliton Solutions with Compact Support for a Family of Two-Parameter Regularized Long-Wave Boussinesq Equations

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Abstract: Searching for special solitary wave solutions with compact support is of important significance in soliton theory. In this paper, to understand the role of nonlinear dispersion in pattern formation, a family of the regularized long-wave Boussinesq equations with fully nonlinear dispersion (simply called R(m,n) equations), $u_{tt}+a(u^n)_{xx}+b(u^m)_{xxtt}=0$ (a, b const.), is studied. New solitary wave solutions with compact support of R(m,n) equations are found. In addition we find another compacton solutions of the two special cases, R(2,2) equation and R(3,3) equation. It is found that the nonlinear dispersion term in a nonlinear evolution equation is not a necessary condition of that it possesses compacton solutions.

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