Advances in Mathematical Sciences and Applications
Vol. 35, No. 2 (2026), pp. 685–698

GAKKOTOSHO
TOKYO JAPAN

NUMERICAL SOLUTION OF GARDNER-KAWAHARA EQUATION

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Abstract. The Gardner–Kawahara equation extends the classical Korteweg–de Vries framework by incorporating cubic nonlinearity and fifth-order dispersion to describe higher-order effects in internal solitary waves. This study applies the pseudospectral method, enhanced with linear damping and a de-aliasing procedure, to achieve stable and accurate long-time simulations of solitary wave propagation. Our results demonstrate the emergence of new soliton-type solutions, including stable single solitons and breaking solitons that evolve into secondary structures. These findings provide new insights into the role of higher-order effects in nonlinear wave dynamics and highlight the potential of extended simulations to improve wave modeling in coastal ocean studies.

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Communicated by Editors; Received February 24, 2026
AMS Subject Classification: 35C07, 35C08, 65T50.
Keywords: Gardner–Kawahara equation, solitary waves, pseudospectral method, nonlinear wave dynamics, numerical simulation.