

Numerical Study of Generalized Damped-forced KdV Equation Using Bifurcation Analysis

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ABSTRACT

In this paper, we consider the generalized Damped Forced KdV equation, which is given by $u_t + Pu^n u_x + Qu_{xxx} + Su = F$, where, $n \in \mathbb{N}$ is the exponent term, and P, Q, S, F denote non-linear, dispersion, damping, and forcing terms, respectively. We consider two forcing terms namely $FF_1(u) = f_0 \cosh(\omega u)$ and $F_2(u) = u(u - v_1)(u - v_2)$, where v_1 and v_2 are free parameters in the present study. We investigate the behavior of our model problem with respect to various parameters involved and analyse various conditions on the parameters for the existence of the various types of solutions, including chaos. The pseudo-spectral method has also been employed to obtain the computed solution for comparison purposes.

Keywords: Generalized Damped Forced KdV Equation; Forcing terms; Bifurcation analysis; the Pseudo- spectral method

