Nonlinear Sciences > Exactly Solvable and Integrable Systems

Symmetry Analysis for a Generalized Kadomtsev-Petviashvili Equation

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A generalized Kadomtsev-Petviashvili equation (GKPE) $(u_t+u u_x + \beta(t)u +\gamma(t)u_{xxx})_x+\sigma(t)u_{yy} = \ 0$ is shown to admit an infinite-dimensional Lie group of symmetries when $\beta(t), \gamma(t)$ and $\sigma(t)$ are arbitrary. The Lie algebra of this symmetry group contains two arbitrary functions $f(t)$ and $g(t)$. Further, low-dimensional subalgebras and physically meaningful five dimensional Lie algebra containing translation and Galilei transformation are derived. A solution of GKPE involving two arbitrary functions of time t, in addition to $f(t)$ and $g(t)$, is obtained using an one-dimensional subalgebra.

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