Lie Symmetry Analysis for Soliton Solutions of Generalised Kadomtsev-Petviashvili-Boussinesq Equation in (3+1)-dimensions

VISHAKHA JADAUN¹, Navnit Jha², and Sachin Ramola³

¹Netaji Subhas University of Technology

²South Asian University

³University of Delhi

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Abstract

The Lie group of infinitesimal transformations technique and similarity reduction is performed for obtaining an exact invariant solution to generalized Kadomtsev-Petviashvili-Boussinesq (gKPB) equation in (3+1)-dimensions. We obtain generators of infinitesimal transformations, which provide us a set of Lie algebras. In addition, we get geometric vector fields, a commutator table of Lie algebra, and a group of symmetries. It is observed that the analytic solution (closed-form solutions) to the nonlinear gKPB evolution equations can easily be treated employing the Lie symmetry technique. A detailed geometrical framework related to the nature of the solutions possessing traveling wave, bright and dark soliton, standing wave with multiple breathers, and one-dimensional kink, for the appropriate values of the parameters involved.

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