Lie Symmetry Reductions of a Coupled Kdv System of Fractional Order

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Abstract: In this paper, we investigate the coupled KdV system of fractional order, which describes a resonant interaction of two wave modes in shallow stratified liquid. The Lie group analysis method is applied for this coupled system. Then the corresponding invariant solutions are obtained using infinitesimal generators. Finally, we determined the reduced fractional ODE system corresponding to the fractional PDE system.

Keywords: *coupled KdV system; Lie symmetry method; Riemann-Liouville derivative; group- invariant solutions; reduced fractional system.*

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1 Introduction

Fractional partial differential equations (FPDEs) are becoming increasingly popular due to their practical applications in various fields of science and engineering, such as polymer physics, viscoelasticity materials, control theory, signal processing, systems identification and electrochemistry [1–5].

So it is necessary to obtain exact solutions or numerical solutions for FPDEs. During last few decades several analytical numerical and semi-analytical methods have been used for solving FPDEs [6, 7, 9, 10, 20].

Lie group analysis originally advocated by Sophus Lie has proven to be an efficient approach for PDEs [8], with the increasing applications of FPDEs, principle procedure of Lie group analysis was extended to FPDEs for finding the exact solution of the equation [11–13].

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