On Symmetries and Invariant Solutions of a Coupled KdV System with Variable Coefficients

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In this paper we investigate symmetries and reductions of a coupled KdV system with variable coefficients. The infinitesimals of the group of transformations which leaves the KdV system invariant, and the admissible forms of the coefficients are obtained using the symmetry method based on the Frechet derivative of the differential operators. An optimal system of conjugacy inequivalent subgroups is then identified with the adjoint action of the symmetry group. For each basic vector field in the optimal sytem the KdV system is reduced to a system of ODEs, which is further studied with the aim of deriving certain exact solutions.