

Symmetry reductions of the rdDym equation via a maximal finite-dimensional symmetry subalgebra

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We perform a group-theoretic analysis of the rdDym equation, extending the results previously obtained by Kumar and co-authors [1,2]. The Lie algebra of point symmetries of the rdDym equation is well known and infinite-dimensional. We identify a 13-dimensional subalgebra characterized by the property of being maximal within the class of finite-dimensional subalgebras that induce arbitrary projective transformations of the time variable (t).

We then carry out a complete classification of all one-dimensional subalgebras of this 13-dimensional algebra and use them to obtain symmetry reductions of the rdDym equation. Among the resulting reduced equations, we distinguish those that can be integrated by quadratures or reduced to solving the Riccati equation.

References

- [1] Kumar, S., Group invariant solutions of (2+1)-dimensional rdDym equation using optimal system of Lie subalgebras, S. Kumar, A.-M. Wazwaz, D. Kumar, A. Kumar, Physica Scripta. - 2019. - Vol. 94, No. 11. - P. 115202.
- [2] Kumar, S. Some closed-form invariant solutions and dynamical behavior of multiple solutions for the (2+1)-dimensional rdDym equation using the Lie symmetry approach, S. Kumar, Results in Physics. - 2021. - Vol. 28. - P. 104642.

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