

# On Applications of the Group Preserving Scheme to the Chen System

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## Abstract

Clearly, Lie groups play a significant role in our understanding of the geometry of differential equations. The concept of Lie groups is very useful in inventing some powerful numerical methods to discretize the ordinary differential equations (ODEs) which preserve the invariant property. So, by sharing the invariance and geometric structure of the original ODEs, new methods which are more accurate, more stable and more effective than the traditional numerical methods can be devised. In the recent years there has been considerable development in the geometric integrator of ODEs evolving on the Lie groups[1], and more generally on the homogeneous spaces as shown by Iserles et al. [2], and Hairer et al. [3]. The present paper, provides a GPS [4,5,6], for the biological Chen system. GPS is an effective and powerful method with time saving which can be treated with ease. The major difference between GPS and the traditional numerical methods is that those schemes are all formulated directly in the usual Euclidean space  $R^n$  none of them are considered in the Minkowski space  $M^{n+1}$ . One of the benefits of GPS in the augmented Minkowski space is that the resulting schemes can avoid the spurious solutions and ghost fixed points.

## References

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