

应用数学与基础数学

非线性微分差分方程守恒律的计算机自动推导

朱娇锋, 柳银萍

华东师范大学计算机科学技术系, 上海200241

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摘要 基于吴消元法和“分治”策略, 改进了基于标度不变性构造非线性微分差分方程多项式形式守恒律的待定系数算法, 并在计算机代数系统 Maple 上实现了改进后的算法, 其中的软件包 CLawDDEs 可自动推导出微分差分方程的守恒密度及连带流. 对于参数化的微分差分方程, CLawDDEs 还能自动过滤出无穷守恒律存在的相容性条件. 因此, CLawDDEs 可作为测试非线性微分差分方程是否可积的有效工具.

关键词 [微分差分方程](#) [守恒律](#) [标度不变性](#) [可积性](#) [符号计算](#)

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Computer automated derivation of conservation laws for nonlinear differential-difference equations (Chinese)

ZHU Jiao-feng, LIU Yin-ping

Department of Computer Science and Technology, East China Normal University, Shanghai 200241, China

Abstract

Based on Wu's elimination method and "divide-and-conquer" strategy, the undetermined coefficient method for constructing polynomial conservation laws of nonlinear differential-difference equations was improved. Furthermore, a Maple package CLawDDEs was developed to automatically derive conserved densities and associated fluxes of polynomial differential-difference equations. For parameterized nonlinear differential-difference equations, CLawDDEs can also filter out the compatibility conditions which admit the existence of infinitely conservation laws. So CLawDDEs can be used as an effective tool to test the integrability of nonlinear differential-difference equations.

Key words [differential-difference equations](#) [conservation laws](#) [scaling invariance](#) [integrability](#) [symbolic computation](#)

DOI:

通讯作者 柳银萍 ypliu@cs.ecnu.edu.cn

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