

Abstract

Generalization of Noether's Conservation Law Theorem to Non-Variational Differential Equations [†]

Stephen Anco

Department of Mathematics & Statistics, Brock University, St Catharines, ON L2S 3A1, Canada; sanco@brocku.ca

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Noether's theorem provides a systematic method to obtain conservation laws (conserved integrals) for differential equations but it requires an equation to have a variational (Lagrangian) formulation. In a series of publications [1–6], a generalization of Noether's theorem has been developed using the concept of adjoint-symmetries. This generalization applies to all differential equations, without requiring that a variational formulation exists, and is algorithmic in the same sense as Lie's method for finding symmetries of differential equations. The main steps in the generalization will be outlined and examples of finding conservation laws for non-variational differential equations will be illustrated.

References

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