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Ilona A. Dzenite[1] **and Delfim F. M. Torres**[2]

[1]Department of Engineering Mathematics
Riga Technical University
Kalku 1, Riga LV-1658, Latvia
ilona.dzenite@yahoo.com

[2]Department of Mathematics
University of Aveiro
3810-193 Aveiro, Portugal
delfim@mat.ua.pt

ABSTRACT

An abstract is required and should summarize, in less than 200 words, the context, content and conclusions of the paper. It should not contain any references or display equations.

Keywords: invariance, optimal control, symmetry transformations, Noether's theorem.

2000 Mathematics Subject Classification: 49K05, 49K15, 49S05.

1 Introduction

Contributions are to be in English. Authors are encouraged to have their contribution checked for grammar. In this paper we propose a different concept of applied mathematical problems for optimal control based on transformations that do not depend on the parameter; a new notion of conservation law; and the corresponding theorem.

2 Optimal Control

This classical theorem is formulated in the context of the calculus of variations. The modern face of the calculus of variations is called *optimal control*. It is a generalization of the calculus of variations that was born in the fifties of the XX century by the proof of the Pontryagin Maximum Principle (Boltyanskiĭ, Gamkrelidze and Pontryagin, 1956).

The dynamical control system is governed by ordinary differential equations of the form

$$\dot{\mathbf{x}}(t) = \frac{d\mathbf{x}(t)}{dt} = f(t, \mathbf{x}(t), \mathbf{u}(t)) \,, \tag{2.1}$$

In general, initial and target states may be given, but one can ignore the boundary conditions with respect to this theorem.

Definition 2.1. A pair is said to be *admissible*...

The problem of Optimal Control is to find the most effective admissible pair, i.e. to find an admissible pair that gives minimum value to mathematical functional ...

Theorem 2.1 (Example of Mathematical Principle). *If ... and if ..., then*

Proof. Consider ... It remains to prove that ... This finishes the proof. □

3 Main Result: Mathematical Theorem

Let the original variables of the mathematical problem be transformed by spaces and parameters diffeomorphisms

$$t \to t^* \,, \quad \mathbf{x} \to \mathbf{x}^* \,, \quad \mathbf{u} \to \mathbf{u}^* \,. \tag{3.1}$$

The first question to address is ... Using (2.1) one can write...

Acknowledgment

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References

Boltyanskiĭ, V. G., Gamkrelidze, R. V. and Pontryagin, L. S. 1956. On the theory of optimal processes, *Dokl. Akad. Nauk SSSR (N.S.)* **110**: 7–10.