Cornell University Library

We gratefully acknowledge support from the Simons Foundation and member institutions

arXiv.org > physics > arXiv:1106.3455

Search or Article-id

(Help | Advanced search)

All papers   Go!

Physics > Physics Education

Applications of a constrained mechanics methodology in economics

Jitka Janová

The paper presents instructive interdisciplinary applications of constrained mechanics calculus in economics on a level appropriate for the undergraduate physics education. The aim of the paper is: 1. to meet the demand for illustrative examples suitable for presenting the background of the highly expanding research field of econophysics even on the undergraduate level and 2. to enable the students to understand deeper the principles and methods routinely used in mechanics by looking at the well known methodology from the different perspective of economics. Two constrained dynamic economic problems are presented using the economic terminology in an intuitive way. First, the Phillips model of business cycle is presented as a system of forced oscillations and the general problem of two interacting economies is solved by the nonholonomic dynamics approach. Second, the Cass-Koopmans-Ramsey model of economical growth is solved as a variational problem with a velocity dependent constraint using the vakonomic approach. The specifics of the solution interpretation in economics compared to mechanics is discussed in detail, a discussion of the nonholonomic and vakonomic approaches to constrained problems in mechanics and economics is provided and an economic interpretation of the Lagrange multipliers (possibly surprising for the students of physics) is carefully explained. The paper can be used by the undergraduate students of physics interested in interdisciplinary physics applications to get in touch with current scientific approach to economics based on a physical background or by university teachers as an attractive supplement to the classical mechanics lessons.

Submission history

From: Jitka Janová [view email]

[v1] Fri, 17 Jun 2011 11:57:09 GMT (98kb)

Which authors of this paper are endorsers?

Link back to: arXiv, form interface, contact.