



Mathematical Physics

Lagrangian-Hamiltonian unified formalism for autonomous higher-order dynamical systems

Pedro D. Prieto-Martínez, Narciso Román-Roy

(Submitted on 16 Jun 2011 (v1), last revised 23 Oct 2012 (this version, v4))

The Lagrangian-Hamiltonian unified formalism of R. Skinner and R. Rusk was originally stated for autonomous dynamical systems in classical mechanics. It has been generalized for non-autonomous first-order mechanical systems, as well as for first-order and higher-order field theories. However, a complete generalization to higher-order mechanical systems has yet to be described. In this work, after reviewing the natural geometrical setting and the Lagrangian and Hamiltonian formalisms for higher-order autonomous mechanical systems, we develop a complete generalization of the Lagrangian-Hamiltonian unified formalism for these kinds of systems, and we use it to analyze some physical models from this new point of view.

Comments: 36 pp. We have corrected and clarified the statement of Proposition 3. A remark is added after Proposition 3

Subjects: **Mathematical Physics (math-ph)**; High Energy Physics - Theory (hep-th)

MSC classes: 70H50, 53C80, 53C15

Journal reference: J. Phys A: Math. Theor. 44(38) (2011) 385203 (35pp)

DOI: [10.1088/1751-8113/44/38/385203](https://doi.org/10.1088/1751-8113/44/38/385203)

Cite as: [arXiv:1106.3261](https://arxiv.org/abs/1106.3261) [math-ph]

(or [arXiv:1106.3261v4](https://arxiv.org/abs/1106.3261v4) [math-ph] for this version)

Submission history

From: Pedro D. Prieto-Martínez [[view email](#)]

[v1] Thu, 16 Jun 2011 16:07:30 GMT (31kb)

[v2] Fri, 15 Jul 2011 11:30:41 GMT (32kb)

[v3] Mon, 12 Sep 2011 12:24:25 GMT (32kb)

[v4] Tue, 23 Oct 2012 10:06:21 GMT (32kb)

[Which authors of this paper are endorsers?](#)

Download:

- [PDF](#)
- [PostScript](#)
- [Other formats](#)

Current browse context:

math-ph

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1106](#)

Change to browse by:

[hep-th](#)

[math](#)

References & Citations

- [NASA ADS](#)

Bookmark (what is this?)

