

Accepted Manuscript

Exponential Stability of Port-Hamiltonian Systems via Energy-Shaped Method

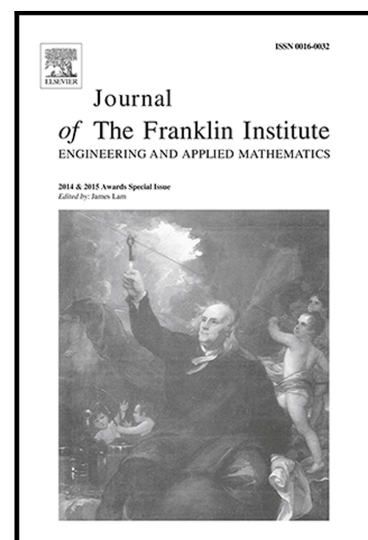
Liangcheng Cai, Yong He

PII: S0016-0032(17)30065-0
DOI: [10.1016/j.jfranklin.2017.02.004](https://doi.org/10.1016/j.jfranklin.2017.02.004)
Reference: FI 2897

To appear in: *Journal of the Franklin Institute*

Received date: 28 June 2016
Revised date: 21 November 2016
Accepted date: 1 February 2017

Please cite this article as: Liangcheng Cai, Yong He, Exponential Stability of Port-Hamiltonian Systems via Energy-Shaped Method, *Journal of the Franklin Institute* (2017), doi: [10.1016/j.jfranklin.2017.02.004](https://doi.org/10.1016/j.jfranklin.2017.02.004)



This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Exponential Stability of Port-Hamiltonian Systems via Energy-Shaped Method

Liangcheng Cai^{a,*}, Yong He^b

^a*School of Electrical Engineering, Southwest JiaoTong University, Chengdu, 610031, China*

^b*School of Automation, China University of Geosciences, Wuhan 430074, China*

Abstract

The traditional energy-shaped method of Port-Hamiltonian system that is based on solving partial differential equations influences the accuracy and realizability of controller. To overcome those defects, a new energy-shaped method based on the cyclo-passivity is proposed to avoid solving partial differential equations. Due to the proposed method, the exponential stability of Port-Hamiltonian has been worked out. Besides that, a relationship between the guaranteed cost control and dissipation is established for the Port-Hamiltonian system, which presents an explicit form of dissipative energy. At last, examples show the validity of the proposed contents.

Keywords: Exponential Stability, Port-Hamiltonian System, Energy-Shaped, Guaranteed Cost Control.

1. Introduction

The Port-Hamiltonian (PH) systems [1] that are useful nonlinear systems dealing with some electrical systems [2, 3, 4], mechanical systems [5, 6, 7], power systems [8, 9] and so on still attract the researcher's interest [10, 11, 12, 13]. To research the PH systems, the energy-shaped that is a key method solves a matching equation to design a control law [3, 5, 6, 14, 15]. Frankly speaking, solving matching equation that is equivalent to solving partial differential equations (PDEs)[3, 5, 6, 14, 15] leads to two defects, i. e., the accuracy and realizability of controller.

*Corresponding author.

Email address: caispss@163.com (Liangcheng Cai)

Download English Version:

<https://daneshyari.com/en/article/4974252>

Download Persian Version:

<https://daneshyari.com/article/4974252>

[Daneshyari.com](https://daneshyari.com)