### Accepted Manuscript

Exact-approximate boundary controllability of the thermoelastic plate with a curved middle surface

Fengyan Yang, Bandar Bin-Mohsin, Goong Chen, Pengfei Yao

 PII:
 S0022-247X(17)30144-0

 DOI:
 http://dx.doi.org/10.1016/j.jmaa.2017.02.005

 Reference:
 YJMAA 21130



Received date: 8 November 2016

<page-header><text><section-header><text><text><text><text>

Please cite this article in press as: F. Yang et al., Exact-approximate boundary controllability of the thermoelastic plate with a curved middle surface, *J. Math. Anal. Appl.* (2017), http://dx.doi.org/10.1016/j.jmaa.2017.02.005

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.

# Exact-approximate boundary controllability of the thermoelastic plate with a curved middle surface

Fengyan Yang<sup>a</sup>, Bandar Bin-Mohsin<sup>b</sup>, Goong Chen<sup>c,\*</sup>, Pengfei Yao<sup>a</sup>

 <sup>a</sup>Key Laboratory of Systems and Control, Institute of Systems Science, Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing 100190, P. R. China
 <sup>b</sup>Department of Mathematics, College of Science, King Saud University, Riyadh, Saudi Arabia
 <sup>c</sup>Department of Mathematics, Texas A & M University, College Station, TX 77843, USA, and Science Program Texas A & M University at Qatar, Education City, Doha, Qatar

#### Abstract

Controllability properties of a thermoelastic plate with a curved middle surface are studied. By the Riemannian geometry approach and the multiplier technique, we obtain simultaneously exact controllability of the displacement of the plate and approximate controllability of the temperature, through three boundary controls under verifiable assumptions on the geometry of the middle surface.

Keywords:

exact-approximate boundary controllability, thermoelastic plate, curved middle surface,

Riemannian geometry, multiplier method

#### 1. Introduction and Main Results

Vibrations of beams, membranes, plates and shells and their controls are an active field of research in engineering, applied science and mathematics. The pioneering work of Timoshenko [25, 26] has established major models of structural elements as the foundations of structural dynamics for technological applications. For these models, modern distributed parameter control theory has found fertile applications. Among them, the multidimensional PDE models of plates and shells are particularly interesting. They require challenging techniques for estimation and control as the PDEs are universally of higher order and often also constitute coupled systems. There is also the added complexity of thermal effects as heat conduction in the material of the structure can affect structural behavior and performance.

There is a sizable amount of literature on thermoelastic beams, plates and shells. It would be arduous for anyone to give a comprehensive review of this subject. However, for the literature

<sup>\*</sup>Corresponding author

Email address: gchen@math.tamu.edu (Goong Chen)

Download English Version:

## https://daneshyari.com/en/article/5775041

Download Persian Version:

https://daneshyari.com/article/5775041

Daneshyari.com