

## Accepted Manuscript

Analysis of a multidimensional thermoviscoelastic contact problem under the Green-Lindsay theory

M. Aouadi, M. Campo, M.I.M. Copetti, J.R. Fernández

PII: S0377-0427(18)30389-3  
DOI: <https://doi.org/10.1016/j.cam.2018.06.037>  
Reference: CAM 11767

To appear in: *Journal of Computational and Applied Mathematics*

Received date: 8 August 2016  
Revised date: 12 April 2018

Please cite this article as: M. Aouadi, M. Campo, M.I.M. Copetti, J.R. Fernández, Analysis of a multidimensional thermoviscoelastic contact problem under the Green-Lindsay theory, *Journal of Computational and Applied Mathematics* (2018), <https://doi.org/10.1016/j.cam.2018.06.037>

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.



# Analysis of a multidimensional thermoviscoelastic contact problem under the Green-Lindsay theory

M. Aouadi<sup>a</sup>

<sup>a</sup>*École Nationale d'Ingénieurs de Bizerte, Université de Carthage  
BP66, Campus Universitaire Menzel Abderrahman 7035, Tunisia*

M. Campo<sup>b</sup>

<sup>b</sup>*Centro Universitario de la Defensa, Escuela Naval Militar  
Plaza de España s/n, 36920 Marín, Spain*

M. I. M. Copetti<sup>c</sup>

<sup>c</sup>*Laboratório de Análise Numérica e Astrofísica, Departamento de Matemática  
Universidade Federal de Santa Maria, 97105-900, Santa Maria, RS, Brazil*

J.R. Fernández<sup>d,\*</sup>

<sup>d</sup>*Departamento de Matemática Aplicada I, Universidade de Vigo  
Escola de Enxeñería de Telecomunicación, Campus As Lagoas Marcosende s/n,  
36310 Vigo, Spain*

---

## Abstract

In this paper, we investigate the existence, the stability and the numerical approximation of a multidimensional dynamic contact problem modeling the evolution of displacement and temperature in a viscoelastic body that may come into contact with a deformable foundation. The viscoelastic body is assumed to behave according to Kelvin-Voigt constitutive law with added thermal effects under the Green-Lindsay theory. We prove that the presence of viscoelastic terms in the equations provides additional regularity and then an existence and uniqueness result is obtained using the Faedo-Galerkin method. An energy decay property is also shown under the assumption of radial symmetry. Then, a numerical approximation based on the finite element method is proposed. A stability result is proved from which the decay of the discrete energy is deduced. A priori error estimates are shown from which the linear convergence is derived under suitable additional regularity conditions. Finally, some numerical experiments are described to support our results.

Download English Version:

<https://daneshyari.com/en/article/8901690>

Download Persian Version:

<https://daneshyari.com/article/8901690>

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