



Uniqueness of Solution to the von Karman Equations with Free Boundary Conditions

J. Oudaani ^{1*}, A. El Mouatasim ² and B. El-Aqqad ³

^{1,2} *Department of Mathematics, Informatics and Management, Ibn Zohr University,
Poly-Disciplinary Faculty, Code Postal 638, Ouarzazate, Morocco.*

³ *College of Idlssan-Ouarzazate, Morocco.*

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Abstract: The purpose of this paper is to give some theoretical results, under weaker hypotheses imposed on the external, internal, linear potential loads and three measurable portions with non null area of the boundary of the shallow shell, for the local existence and uniqueness of solution to the stationary von Karman equations, with free-type boundary conditions of the elastic shallow shell. Finally, in some theoretical results, we describe an iterative method for constructing a unique weak solution for the problem.

Keywords: *static von Karman equations; free-type boundary; elastic shallow shell.*

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1 Introduction

In nonlinear three-dimensional elasticity theory, the stationary von Karman equations are two dimensional equations for the nonlinearly elastic shallow shell. The mathematical model is a modeling of the physical situation of buckling phenomenon of the elastic shallow shell, which is perturbed by the external and internal forces and potentially non conservative loads $L(\cdot)$ applied to the system, see [3]. In case of free-type and mixed homogenous boundary conditions, we know the static von Karman equations for vertical displacement u of the middle surface of the reference configuration of the shell from a plane, and the Airy stress function ϕ has the form, see, for instance, [3].

* Corresponding author: <mailto:oudaani1970@gmail.com>