ON THE STUDY OF VARIATIONAL INEQUALITY
OF GENERALIZED MARGUERRE–VON KÁRMÁN'S TYPE
VIA LERAY–SCHAUDER DEGREE

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Abstract. The objective of this work is to study the existence theory for a class of variational inequalities of generalized Marguerre–von Kármán's type, which model unilateral problem for the buckling of generalized Marguerre–von Kármán shallow shells. More specifically, we reduce this problem to a variational inequality with cubic operator. Then, we prove the existence of solutions to this problem by using the Leray–Schauder degree.

1. Introduction

In the first half of the previous century, Marguerre [16], von Kármán and Tsien [21] derived the classical Marguerre–von Kármán equations consisting of a system of fourth order semilinear elliptic equations, which are two-dimensional equations for a nonlinearly elastic shallow shell subjected to boundary conditions analogous to those for plates [20]. They play an important role in applied mathematics.

The first justification of the classical Marguerre–von Kármán equations was done by Ciarlet and Paumier [4] by using a formal asymptotic analysis. Next, Gratie [12] generalized these equations for the case, where only a part of the