



Anca Capatina

Variational Inequalities and Frictional Contact Problems

Series: **Advances in Mechanics and Mathematics**

- **Presents complex information in an accessible style**
- **Supports assertions with specific proofs**
- **Addresses abstract results on variational and quasi-variational inequalities**

Variational Inequalities and Frictional Contact Problems contains a carefully selected collection of results on elliptic and evolutionary quasi-variational inequalities including existence, uniqueness, regularity, dual formulations, numerical approximations and error estimates ones. By using a wide range of methods and arguments, the results are presented in a constructive way, with clarity and well justified proofs. This approach makes the subjects accessible to mathematicians and applied mathematicians. Moreover, this part of the book can be used as an excellent background for the investigation of more general classes of variational inequalities. The abstract variational inequalities considered in this book cover the variational formulations of many static and quasi-static contact problems. Based on these abstract results, in the last part of the book, certain static and quasi-static frictional contact problems in elasticity are studied in an almost exhaustive way. The readers will find a systematic and unified exposition on classical, variational and dual formulations, existence, uniqueness and regularity results, finite element approximations and related optimal control problems. This part of the book is an update of the Signorini problem with nonlocal Coulomb friction, a problem little studied and with few results in the literature. Also, in the quasi-static case, a control problem governed by a bilateral contact problem is studied. Despite the theoretical nature of the presented results, the book provides a background for the numerical analysis of contact problems. The materials presented are accessible to both graduate/under graduate students and to researchers in applied mathematics, mechanics, and engineering. The obtained results have numerous applications in mechanics, engineering and geophysics.

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