Plates and Shells

Michel Fortin
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Editor

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10 9 8 7 6 5 4 3 2 1 04 03 02 01 00 99
Contents

Preface vii

Derivation and Justification of Plate Models by Variational Methods
Stephen M. Alessandrini, Douglas N. Arnold, Richard S. Falk, and Alexandre L. Madureira 1

Simple Triangular Shell Elements for Large Strain Estimations of Sheet Metal Forming Parts
Jean-Louis Batoz, Ying Qiao Guo, and Frédéric Mercier 21

Some Approximation Methods for Linear Thin Shell Problems
Michel Bernadou 37

Numerical Analysis of Piezoelectric Shells
Michel Bernadou and Christophe Haenel 55

Étude intrinsèque d’un problème de coque en grandes déformations
M. Carrassi and P. Le Tallec 65

Locking-Free Mixed Stabilized Finite Element Methods for Bending-Dominated Shells
Dominique Chapelle and Rolf Stenberg 81

Un élément de coque simple à trois nœuds en grandes rotations et élastoplasticité
F. Dammak, S. Chamlal, A. Gakwaya, and G. Dhatt 95

Intrinsic Nonlinear Models of Shells
Michel C. Delfour and Jiabin Zhao 109

Convergence of the Linear \( P(1,1) \) and \( P(2,1) \) Thin Shells to Asymptotic Shells
Michel C. Delfour and Jean-Paul Zolésio 125

Two-Level Overlapping Schwarz Methods for Plate Elements on Unstructured Meshes Using Non-Matching Coarse Grids
Qingping Deng and Xiaobing Feng 159

Large Elasto-Plastic Deformations of Thin Shells with Application to the Stamping of Anisotropic Sheet Metal Parts
J.-C. Gelin and L. Boubakar 171
CONTENTS

Justification of Two-Dimensional Linear Shell Models by the Use of T-Convergence Theory
Karine Genevey 185

Numerical Simulation of High-Rate Stamping of Tubes and Sheets
S. F. Golovashchenko and N. M. Bessonov 199

An Intrinsic Form of the Stress Resultant Geometrically Exact Shell Theory
Adnan Ibrahimbegović 209

Numerical Inf-Sup Analysis of MITC Plate Bending Elements
Alexander Iosilevich, Klaus-Jürgen Bathe, and Franco Brezzi 225

Optimisation des plaques et coques
E. Pagnacco and J. E. Souza de Cursi 243

Vibroacoustic Behavior of a Rectangular Box
M. A. Tournour and N. Atalla 255

Error Analysis of Mixed Finite Elements for Cylindrical Shells
Geng Yang, Michel C. Delfour, and Michel Fortin 267
Preface

The 1996 Summer Seminar of the Canadian Mathematical Society took place in Québec city from July 22 to July 27, in the building of l’École d’Architecture at the Université Laval. The scientific committee consisted of

- Michel Fortin (chair), Département de mathématiques et de statistique, Laval,
- Mario Fafard, Département de Génie civil, Laval,
- Michel Delfour, Centre de recherches mathématiques, Montréal.

The objective of this Seminar was to bring together both mathematicians and engineers interested in the theory or application of plates and shells, or more generally in the modelisation of thin structures. From this it was hoped that there could emerge a better understanding of the problem: mathematicians could become more aware of how actual engineering applications were performed and engineers would know better what information of theoretical results could provide.

Thin structures are met everywhere in applications. Their approximation by a lower-dimensional model is natural and almost compulsory. It is also full of pitfalls and some engineering catastrophes can be attributed to bad numerical schemes for shells.

From the mathematical point of view, many studies try to make clearer the convergence of full three-dimensional models to models of plates or shells. In particular, the underlying assumptions are made more explicit.

Numerical methods are the key to actual computations. Thin structures are known to need special methods, often inspired by mixed finite element methods. The goal is to avoid numerical locking while providing a good accuracy.

New applications, such as the simulation of crash in the automobile industry, bring new challenges as models and method are stretched to their extreme limit.

All these aspects are reported in these Proceedings which give a snapshot of the state of the art of a fast evolving subject.

Michel Fortin
Montréal, February 1999
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