



MONOGRAPHS

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Plates and Shells in Nature, Mechanics and Biomechanics

(with I.V. Andrianov)
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monograph, 184 pages, in Polish

SUMMARY



This monograph can be treated as an attempt to original analysis of the plates and shells role in our nature, mechanics and biomechanics. In the Introduction the fundamental background of elasticity of deformable bodies, stress-strain states, Hooke's law, Young's modulus and Poisson's coefficients are given.

In Chapter 2 the occurrence of shells and plates as the elements of our Earth surface, buildings or internal human organs are discussed and illustrated. A lot of interesting information not known to a reader so far is reported.

In Chapter 3 a historical background of the plates and shells theory is given.

Chapter 4 is devoted to the overview of the historical development of plates and shells with the emphasis on asymptotic and numerical methods development and their impact on the shell theory. After a brief introduction, a general description of an averaging approach in the shells theory is given. It is shown that sometimes what seems to be bad can be usefully applied. This sentence is supplemented by the appropriate examples. Then today's asymptotology and the computer-oriented methods are compared and discussed.

In Chapter 5 the plates and shells theory precursors are described with their short biographies. It includes, among others, the biographies of Johann I Bernoulli, Jacob I Bernoulli, Daniel I Bernoulli, Enrico Betti, Augustin Louis Cauchy, Ernst Florens Chladni, Jean D'Alembert, Adhemar Jean de Saint-Venant, Leonard Euler, Marie-Sophie Germain, Robert Hooke, Edward Hu Law, Gustav Robert Kirchhoff, Werner Tjardus Koiter, Joseph Louise Lagrange, Gabriel Lamé, Pierre Simon Laplace, Łurie Anatolij Isakowicz, Claude Navier, Witold Nowacki, Walentin Walentynowicz Nowożyłow, Denis Siméon Poisson, Lord Rayleigh, Eric Reissner, Stepan Prokofiewicz Timoszenko, Własow Wasilij Zacharowicz.

Chapter 6 includes today's state-of-the-art and perspectives of theory and practice development in the field of plates and shells dynamics.

In Chapter 7 some interesting examples of nonlinear dynamics of plates and shells are outlined. Among others, chaotic dynamics and solitons are discussed and reported.

Chapter 8 consists of historical as well as new development directions of plates and shells theory, their physical behaviour and mathematical models and it includes the methods of analysis of plates and shells.

The Chapter 9 written by Professor M. Kotełko and J. Rhodes is devoted to thin walled profile materials, plastic mechanisms of their damage and the numerical methods used for their analysis.

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