Introduction to Analysis and Design of Plate Panels

The present notes cover plate theory dealing with bending, vibrations, elastic buckling and ultimate strength. The plate structures considered are isotropic, orthotropic and stiffened plates made of metallic materials. The main objective of the notes is to give an introduction to plates and plate panels and to present some fairly easy methods and results to be used in the design phase to judge, whether a plate panel can be considered safe from a structural point of view or requires a more detailed numerical analysis, typically using the Finite Element Method. Furthermore, a short introduction to the theory of shells is included. There are many relevant textbooks on linear analysis of plates. The most recent is Szilard (2004), which contains a large number of examples (1024 pages in total plus a CD with numerous results). Plate failure is covered very well in Hughes (1988) (with the focus on plate panels used in ship structures) and Jones (1997) (dealing mostly with impact responses). Finally, a recent book also including shell structures is Ventsel and Krauthammer (2001). Compared to the textbooks cited above the present treatment puts more emphasis on stiffened plates than usually seen. However, composite materials as glass-fibre-reinforced plates, sandwich plates and reinforced concrete plates are not included as they are topics for other courses. The present notes are mainly based on Pedersen and Jensen (1983), written in Danish. The first version of the notes was prepared by Marie L"uten in 2002. It has now been amended and extended with ultimate strength of plates, an introduction to the theory of shells and additional examples to cover the lecture material for the course "41215 Plate and Shell Structures" at the Department of Mechanical Engineering, the Technical University of Denmark. Comments and amendments received by the students in the course have had a significant influence on the present layout. A special thanks to Torben Christiansen for careful proof-readings of the examples and valuable improvements.

General information
State: Published
Organisations: Coastal, Maritime and Structural Engineering, Department of Mechanical Engineering
Contributors: Jensen, J. J., Lützen, M.
Number of pages: 139
Publication date: 2006

Publication information
Place of publication: DTU
Publisher: Technical University of Denmark (DTU)
Edition: 1st
ISBN (Print): 87-89502-61-2
Original language: English
Source: orbit
Source-ID: 193081
Research output: Research - peer-review › Book – Annual report year: 2006