UCL Université catholique de Louvain

LMECA2520

2012-2013

Compléments d'élasticité : calcul de structures planes

5.0 credits	30.0 h + 30.0 h	2q

Teacher(s) :	Doghri Issam ; Remacle Jean-François ;
Language :	Français
Place of the course	Louvain-la-Neuve
Main themes :	- The objective of the course is to show analytically -in simple cases- and numerically how to model and solve an important class of so-called planar structures, i.e. such that their mechanical problem is reduced to two space dimensions. - The problems involve " long " solids under plane strain, " thin " solids under plane stress and thin or thick plates under bending loads. - For each class of problems, appropriate formulations will be developed, together with their finite element discretization, in view of their numerical resolution using a specialized software. Some rather simple problems will also be solved analytically in order to better understand the theory.
Aims :	Analytical and numerical modeling of two-dimensional problems in linear elasticity: - plane strain; - plane stress; - bending of plates. *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Content :	Chapitre 1 : Plane strain and plane stress in Cartesian coordinates. Chapitre 2 : Plane strain and plane stress in cylindrical coordinates. "Chapitre 3 : Kirchhoff-Love plate theory in Cartesian coordinates. Chapitre 4 : Kirchhoff-Love plate theory in cylindrical coordinates. Chapitre 5 : Reissner-Mindlin plate theory. Chapitre 6 : Finite element formulations of plate theories. Travaux pratiques : - Resolution of several relatively simple problems dealing usually with direct applications of the theory (e.g., tube under inner and outer pressures, stress concentration in a plate with a small circular hole, force on the straight edge of a semi-infinite plate, bending of a circular plate under axisymmetric loading, etc.) - Use of a finite element numerical software, in order to understand the main steps of the method (geometry definition, input of material data and other problem parameters, space and time discretization, solver algorithms, post-processing and visualization of computation results).
Other infos :	Mécanique des Solides Déformables (Mechanics of Deformable Solids).
Cycle and year of study :	> Master [120] in Architecture and Engineering > Master [120] in Civil Engineering > Master [120] in Electro-mechanical Engineering > Master [120] in Mechanical Engineering > Master [120] in Chemical and Materials Engineering
Faculty or entity in charge:	MECA