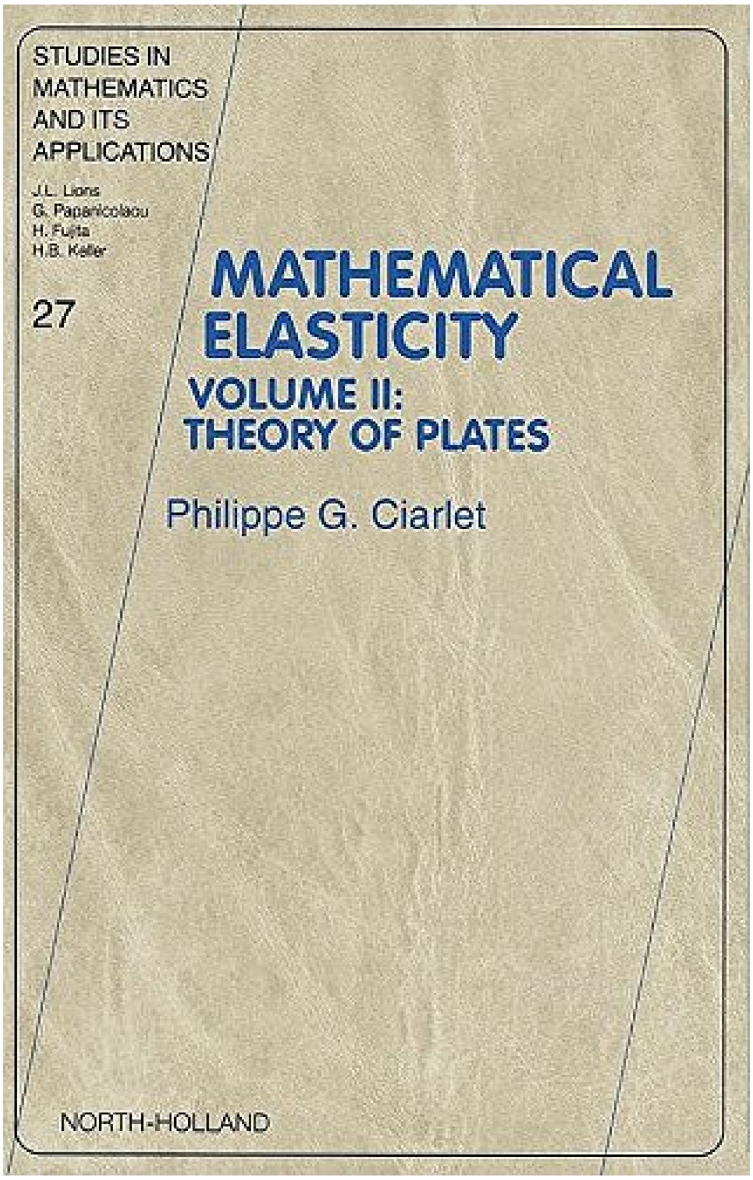
Mathematical Elasticity: Volume II: Theory of Plates



Par Phililppe G. Ciarlet
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[Free pdf] Mathematical Elasticity: Volume II: Theory of Plates

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Description :

Prsentation de l'diteurThe objective of Volume II is to show how asymptotic methods, with the thickness as the small parameter, indeed provide a powerful means of justifying two-dimensional plate theories. More specifically, without any recourse to any a priori assumptions of a geometrical or mechanical nature, it is shown that in the linear case, the three-dimensional displacements, once properly scaled, converge in H1 towards a limit that satisfies the well-known two-dimensional equations of the linear Kirchhoff-Love theory;

the convergence of stress is also established.In the nonlinear case, again after ad hoc scalings have been performed, it is shown that the leading term of a formal asymptotic expansion of the three-dimensional solution satisfies well-known two-dimensional equations, such as those of the nonlinear Kirchhoff-Love theory, or the von Krmn equations. Special attention is also given to the first convergence result obtained in this case, which leads to two-dimensional large deformation, frame-indifferent, nonlinear membrane theories. It is also demonstrated that asymptotic methods can likewise be used for justifying other lower-dimensional equations of elastic shallow shells, and the coupled pluri-dimensional equations of elastic multi-structures, i.e., structures with junctions. In each case, the existence, uniqueness or multiplicity, and regularity of solutions to the limit equations obtained in this fashion are also studied.Revue de presse...It is an important work describing the justification of two-dimentional engineering theories of plates and shallow shells and should be purchased by university libraries.Applied Mechanics s, Vol.51, No.6Prsentation de l'diteurThe objective of Volume II is to show how asymptotic methods, with the thickness as the small parameter, indeed provide a powerful means of justifying two-dimensional plate theories. More specifically, without any recourse to any a priori assumptions of a geometrical or mechanical nature, it is shown that in the linear case, the three-dimensional displacements, once properly scaled, converge in H1 towards a limit that satisfies the well-known two-dimensional equations of the linear Kirchhoff-Love theory; the convergence of stress is also established.In the nonlinear case, again after ad hoc scalings have been performed, it is shown that the leading term of a formal asymptotic expansion of the three-dimensional solution satisfies well-known two-dimensional equations, such as those of the nonlinear Kirchhoff-Love theory, or the von Krmn equations. Special attention is also given to the first convergence result obtained in this case, which leads to two-dimensional large deformation, frame-indifferent, nonlinear membrane theories. It is also demonstrated that asymptotic methods can likewise be used for justifying other lower-dimensional equations of elastic shallow shells, and the coupled pluri-dimensional equations of elastic multi-structures, i.e., structures with junctions. In each case, the existence, uniqueness or multiplicity, and regularity of solutions to the limit equations obtained in this fashion are also studied.