Povzetek

Eden izmed načinov, kako se lotiti vprašanja obstoja in enoličnosti rešitve podane parcialne diferencialne enačbe z robnimi pogoji, je sledeč. Definiramo primeren funkcijski (Hilbertov) prostor, v katerem enačbo zapišemo v variacijski obliki in ji priredimo simetrično bilinearno formo. S sredstvi iz funkcionalne analize lahko, v kolikor je ta forma omejena in eliptična, pokažemo, da je rešitev variacijske naloge ena sama.

Predmet tega dela je Kornova neenakost, ki je ključno sredstvo pri dokazovanju eliptičnosti bilinearne forme, prirejene robnemu problemu linearne elastostatike. Zato bomo v prvem poglavju spoznali področje, iz katerega Kornova neenakost izhaja, in orisali izpeljavo parcialne diferencialne enačbe, ki nam problem določa. V drugem poglavju bomo vpeljali prostor Soboljeva in izpeljali vse potrebno orodje iz funkcionalne analize, v tretjem pa se bomo posvetili Kornovi neenakosti. Nato bomo v četrtem pokazali njen pomen pri reševanju robnega problema linearne elastostatike, ki se ga bomo lotili na zgoraj opisan način.

Bolj podrobno pa je posamezno poglavje predstavljeno na njegovem začetku.

Abstract

One way to see whether a partial differential equation with given boundary conditions has a solution and whether the solution is unique is to give a variational formulation of the problem in a suitably defined functional (Hilbert) space. If the simetrical bilinear form belonging to the problem is bounded and elliptic we can by means of functional analysis prove that the solution is unique.

Subject of this work is Korn inequality. It plays an essential role in proving ellipticity of the bilinear form belonging to the boundary problem of linear elastostatics. Therefore in Chapter 1 we explore this field and describe the way to the problem determining partial differential equation. In Chapter 2 we define Sobolev space and deduce all necessary tools from functional analysis. Chapter 3 is dedicated to Korn inequality. Its importance in solving the boundary problem of linear elastostatics is shown in Chapter 4.

At the beginning of each chapter is more detailed preview.

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