The effect of stabilization in finite element methods for the optimal boundary control of the Oseen equations

Abstract:
We study the effect of the Galerkin/Least-Squares (GLS) stabilization on the finite element discretization of optimal control problems governed by the linear Oseen equations. Control is applied in the form of suction or blowing on part of the boundary. Two ways of including the GLS stabilization into the discretization of the optimal control problem are discussed. In one case the optimal control problem is first discretized and the resulting finite-dimensional problem is then solved. In the other case, the optimality conditions are first formulated on the differential equation level and are then discretized. Both approaches lead to different discrete adjoint equations and depending on the choice of the stabilization parameters and grid size, may significantly affect the computed control. The effect of the order in which the discretization is applied and the choice of the stabilization parameters are illustrated using two test problems. The cause of the differences in the computed controls are explored numerically. Diagnostics are introduced that may guide the selection of sensible stabilization parameters.

Stichworte:
optimal boundary control, stabilized finite element methods, oseen equations, solution accuracy

Dewey Dezimalklassifikation neu:
620 Ingenieurwissenschaften

Zeitschriftentitel:
Finite Elements in Analysis and Design

Jahr:
2004

Band:
41

Heft / Issue:
3

Seiten:
229-251

Reviewed:
ja

Sprache:
en

Volltext / DOI:
http://doi.org/10.1016/j.finel.2004.06.001

Status:
Verlagsversion / published

Semester (für SAP-Datenerfassung):
SS 04

Format:
Text

Occurences:
· Einrichtungen > Fakultäten > Fakultät für Maschinenwesen > Institut für Werkstoffe und Verarbeitung > Lehrstuhl für Numerische Mechanik (Prof. Wall) > Peer-Reviewed Publications > 2004

entries: