Asociación Argentina
de Mecánica Computacional

Resúmenes de Mecánica Computacional Vol II, pp. 239-239
A. Caggiano, G. Etse, P. Folino, M. Goldschmit, M. Pucheta, M. Storti (Eds.)
R. Ausas, A. Lew, S. Márquez Damián, M. Storti (Issue eds.)
Buenos Aires, November 11-14, 2025

NITSCHE'S PRESCRIPTION OF DIRICHLET CONDITIONS FOR DARCY'S PROBLEM AND THE MIXED FORMULATION OF THE ELASTICITY PROBLEM

Ramón Codina[a]

[a]*International Center for Numerical Methods in Engineering (CIMNE), Universitat Politècnica de Catalunya, Campus Nord UPC, 08034 Barcelona, Spain, ramon.codina@upc.edu, http://www.cimne.upc.es*

Keywords: Finite Element Method, Darcy's Problem, Linear Elasticity, Nitsche's Method

Abstract.

In this work we consider the finite element approximation of two problems with a similar mathematical structure—Darcy's problem and the problem of linear elasticity. Each of these problems is approximated with two finite element formulations. In the first one, inf-sup stable interpolations are assumed for the two variables in play, namely, ve- locity and pressure for Darcy's problem and stress and displacement for the elasticity problem. The second formulation is a stabilised fi- nite element method based on the variational multiscale concept that permits arbitrary interpolations for the unknowns. Both problems and both formulations admit two functional frameworks, the primal and the dual one, with a change in regularity of the unknowns that is reflected in a change in the rate of convergence. This collection of problems and formulations is analysed in conjunction with Nitsche's method to prescribe Dirichlet boundary conditions. We explain the method for each case and provide stability and convergence results.

ISSN: 3072-7723 DOI: 10.70567/rmc.v2.ocsid8678