

STOPPING CRITERIA FOR MIXED FINITE ELEMENT PROBLEMS*

M. ARIOLI[†] AND D. LOGHIN[‡]

Abstract. We study stopping criteria that are suitable in the solution by Krylov space based methods of linear and non linear systems of equations arising from the mixed and the mixed-hybrid finite-element approximation of saddle point problems. Our approach is based on the equivalence between the Babuška and Brezzi conditions of stability which allows us to apply some of the results obtained in [M. Arioli, D. Loghin, and A. Wathen, *Stopping criteria for iterations in finite-element methods*, Numer. Math., 99 (2005), pp. 381–410]. Our proposed criterion involves evaluating the residual in a norm defined on the discrete dual of the space where we seek a solution. We illustrate our approach using standard iterative methods such as MINRES and GMRES. We test our criteria on Stokes and Navier-Stokes problems both in a linear and nonlinear context.

Key words. augmented systems, mixed and mixed-hybrid finite-element, stopping criteria, Krylov subspaces method

AMS subject classifications. 65F10, 65F35, 65F50, 65N30

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[†]Rutherford Appleton Laboratory, Chilton, Didcot, Oxfordshire, OX11 0QX, UK (m.arioli@rl.ac.uk). The work of the first author was supported in part by EPSRC grants GR/R46641/01 and GR/S42170.

[‡]University of Birmingham, Watson Building, Birmingham B15 2TT, UK (loghind@for.mat.bham.ac.uk).