

A BDDC ALGORITHM FOR FLOW IN POROUS MEDIA WITH A HYBRID FINITE ELEMENT DISCRETIZATION*

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Abstract. The BDDC (balancing domain decomposition by constraints) methods have been applied successfully to solve the large sparse linear algebraic systems arising from conforming finite element discretizations of elliptic boundary value problems. In this paper, the scalar elliptic problems for flow in porous media are discretized by a hybrid finite element method which is equivalent to a nonconforming finite element method. The BDDC algorithm is extended to these problems which originate as saddle point problems. Edge/face average constraints are enforced across the interface and the same rate of convergence is obtained as in conforming cases. The condition number of the preconditioned system is estimated and numerical experiments are discussed.

Key words. BDDC, domain decomposition, saddle point problem, condition number, hybrid finite element method

AMS subject classifications. 65N30, 65N55, 65F10

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