# DOMAIN DECOMPOSITION ALGORITHMS FOR FIRST-ORDER SYSTEM LEAST SQUARES METHODS[*]

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**Abstract.** First-order system least squares methods have been recently proposed and analyzed for second order elliptic equations and systems. They produce symmetric and positive definite discrete systems by using standard finite element spaces which are not required to satisfy the inf-sup condition. In this paper, several domain decomposition algorithms for these first-order least squares methods are studied. Some representative overlapping and substructuring algorithms are considered in their additive and multiplicative variants. The theoretical and numerical results obtained show that the classical convergence bounds (on the iteration operator) for standard Galerkin discretizations are also valid for least squares methods. Therefore, domain decomposition algorithms provide parallel and scalable preconditioners also for least squares discretizations.

**Key words.** Domain decomposition, first-order system least squares.

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