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Constantin Bacuta* (bacuta@udel.edu), 501 Ewing Hall, University of Delaware, Newark, DE 19716, and **Jacob Jacavage** (jjacav@udel.edu), 501 Ewing Hall, Newark, DE 19716. *Saddle point least squares methods for first order systems.*

We introduce a Saddle Point Least Squares method for discretizing first and second order boundary value problems written as primal mixed variational formulations. For the mixed formulation we assume a stability LBB condition and a data compatibility condition at the continuous level. For the proposed discretization method a discrete inf – sup condition is automatically satisfied by the natural choices of test spaces (first) and the corresponding trial spaces (second). The discretization and the iterative approach does not require nodal bases for the trial space and an SPD preconditioner acting on the discrete test space can be adopted to speed up the approximation process. A stopping criterion based on matching the order of the the iteration error with the the order of the expected discretization error can be considered. Applications of the method include discretizations of first order systems of PDEs, such as *div – curl* systems and time-harmonic Maxwell equations. (Received September 26, 2017)