Jacob Jacavage* (jjacav@udel.edu) and Constantin Bacuta. Least squares discretization and multilevel preconditioning for mixed variational formulations.

We consider a least squares method for discretizing boundary value problems written as primal mixed variational formulations. A stability LBB condition and a data compatibility condition is assumed at the continuous level. For the proposed discretization method, a discrete inf-sup condition is automatically satisfied by natural choices of test and trial spaces. For the proposed discrete spaces and solvers, bases are needed only for the test spaces and assembly of a global saddle point system is avoided. A multilevel preconditioning approach, that could take into consideration discontinuous coefficients and the coupled physics of the problem to be solved, is also presented. Applications include discretizations of second order PDEs with oscillatory or rough coefficients and first order systems of parametric PDEs, such as the time-hamonic Maxwell equations. (Received July 06, 2018)