
Steffen Muenzenmaier
**A Comparison of Finite Element Spaces for
 $H(\textit{div})$ -Conforming First-Order System Least Squares**

1ECOT
Engineering Office Tower
1111 Engineering Drive
Boulder CO 80309
`steffen.muenzenmaier@colorado.edu`
Christopher Leibs
Thomas Manteuffel

First-order system least squares (FOSLS) is a commonly used technique in a wide range of physical applications. FOSLS discretizations are straightforward to implement and offer many advantages over traditional Galerkin or saddle point formulations. Often these problems are formulated in $H(\textit{div})$ spaces and $H(\textit{div})$ -conforming elements are used. These elements have lesser regularity assumptions than the commonly used H^1 -conforming elements and are therefore believed to be more suited for singular problems arising in many applications. This talk will compare the approximation properties of the $H(\textit{div})$ -conforming Raviart-Thomas and Brezzi-Douglas-Marini elements to H^1 -conforming piecewise polynomials in a $H(\textit{div})$ -setting. Furthermore a H^1 -formulation for these problems will be used and compared to the $H(\textit{div})$ -formulation. For the comparison typical Poisson/Stokes problems are examined and singular solutions will be addressed by adaptive refinement strategies.