

1145-76-1149

Young Ju Lee* (yjlee@txstate.edu), Texas State University, San Marcos, TX , and
Hengguang Li (li@wayne.edu), Wayne State University, Detroit, MI. *Locally conservative finite elements for axisymmetric Stokes equation.*

In this talk, we shall consider the mixed finite element approximation of the axisymmetric Stokes problem (ASP) on a bounded polygonal domain in the rz -plane. Standard stability results on mixed methods do not apply due to the singular coefficients in the differential operator and due to the singular or vanishing weights in the associated function spaces. We develop new finite element analysis in these weighted spaces, and propose macroelement conditions that are sufficient to ensure the well-posedness of the mixed methods for the ASP. These conditions are local, relatively easy to verify, and therefore will be useful for validating the stability of a variety of mixed finite element methods. These new conditions can not only re-verify existing stable mixed methods for the ASP, but also lead to the discovery of new stable conservative mixed methods. In particular, we report newly discovered, locally conservative finite elements for axisymmetric Stokes equation, numerical test results that confirm the theory and applications. (Received September 19, 2018)