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**Treatment of Interface Conditions for Coupled
Stokes-Darcy Flow in Least Squares Finite Element
Methods**

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In this talk we will present a least squares based finite element method for
the coupled Stokes-Darcy flow. These problems typically arise in investigating the interaction between surface and groundwater flow. Both subproblems
are well understood and there are several approaches in setting up an elliptic least squares functional. We choose a velocity-stress for Stokes flow and a
flux-pressure formulation for Darcy flow where all process variables involved in
interface conditions are directly available. Nonetheless formulating the coupled
problem using appropriate boundary conditions on the interface is essential to
guarantee well-posedness and the property of the least squares functional as an
error estimator. Still, while ensuring the well-posedness of the problem, the
practicability of the method has to be considered.

Numerical experiments using Raviart-Thomas (for each stress component and
the flux) and standard conforming piecewise polynomials (for the velocities and
the hydraulic potential) will be presented. Using the least squares functional as
local error estimator an adaptive refinement strategy will be investigated.