

# AN ADAPTIVE MULTISCALE METHOD FOR THE STOKES PROBLEM IN POROUS MEDIA

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We describe an adaptive numerical multiscale method for the Stokes problem in porous media. Darcy's law is used as an effective equation and is solved on a macroscopic mesh using the finite element method with numerical quadrature. Macroscopic permeabilities are recovered from micro finite element calculations for Stokes problems on sampling domains centered at quadrature points in each macro element. Rigorous residual-based a posteriori error estimates are derived for errors committed on macro and micro scales and an adaptive method that balances the macro and micro error is proposed. Numerical experiments of the method on various two-dimensional and three-dimensional locally periodic porous media are presented and confirm the expected efficiency of the adaptive multiscale method.