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**ILU preconditioners for non-symmetric saddle point  
matrices with application to the incompressible  
Navier–Stokes equations**

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The talk focuses on threshold incomplete LU factorizations for non-symmetric saddle point matrices. The research is motivated by the numerical solution of the linearized incompressible Navier–Stokes equations. The resulting preconditioners are used to accelerate the convergence of a Krylov subspace method applied to finite element discretizations of fluid dynamics problems in three space dimensions. We shall discuss the stability of the factorization for generalized saddle point matrices and consider an extension for non-symmetric matrices of the Tismenetsky–Kaporin incomplete factorization. We demonstrate that in numerically challenging cases of higher Reynolds number flows one benefits from using this two-parameter modification of a standard threshold ILU preconditioner. The performance of the ILU preconditioners is studied numerically for a wide range of flow and discretization parameters, and the efficiency of the approach is shown if threshold parameters are chosen suitably. The practical utility of the method is further demonstrated for the haemodynamic problem of simulating a blood flow in a right coronary artery of a real patient.