## Preconditioning And The Iterative Solution Of PDE Problems

Andy Wathen OXFORD UNIVERSITY, UNITED KINGDOM Andy.Wathen@comlab.ox.ac.uk

I will review iterative numerical linear equation solvers in the context of large sparse systems arising from the approximation of Partial Differential Equations, emphasising the roles of Krylov subspace methods such as Conjugate Gradients and briefly showing also the capability of multigrid methods. After a brief survey of approaches to preconditioning and its use with iterative methods, I will concentrate on the class of saddle-point problems and in particular on discretisations of the incompressible Navier-Stokes equations describing incompressible fluid flow. I will show how very rapid iterative solutions can be obtained for very large problems with appropriate block preconditioning strategies which include the use of a multigrid method for a subproblem.