

Adaptive methods for time-dependent PDEs

Charalambos Makridakis

Department of Applied Mathematics,

University of Crete

Institute of Applied and Computational

Mathematics, FORTH, Greece

makr@tem.uoc.gr

Self adjusted meshes have important benefits approximating PDEs with solutions that exhibit nontrivial characteristics. When appropriately chosen, they lead to efficient, accurate and robust algorithms. Error control is also important, since appropriate analysis can provide guarantees on how accurate the approximate solution is through a posteriori estimates. Error control may lead to appropriate adaptive algorithms by identifying areas of large errors and adjusting the mesh accordingly. Successful error control and associated adaptive algorithms for important equations in Mathematical Physics is an open problem. In this talk we consider the main structure of an algorithm which permits mesh redistribution with time and the nontrivial characteristics associated with it. We present improved algorithms and we discuss successful approaches towards error control for model problems (linear and nonlinear) of parabolic or hyperbolic type.