

Moving Mesh Methods for Incompressible Flow Simulations

Tao Tang

Hong Kong Baptist University

Abstract: We shall discuss the class of adaptive grid methods often called moving mesh methods (or dynamic methods – in contrast to the static methods) for solving time dependent PDEs. These methods involve the solution of the underlying PDE for the physical problem solution in conjunction with a so-called moving mesh PDE for the mesh itself. This talk will describe some recent developments on moving mesh methods for incompressible flow simulations. Our moving mesh schemes are based on a fractional step approach. At each time level, the mesh will be adjusted based on the regularity of the solution, and then proper interpolation step is used to update the numerical solutions on the new grid. The Navier-Stokes equations are then solved on the new grid using appropriate finite difference or finite element method. Special attention has to be taken to make sure that the overall scheme can guarantee the divergence free property and the formal accuracy of the PDE solvers (when the underlying solution is smooth). In this talk, we will also discuss some preliminary results on the theoretical aspects of this approach.