

STENCIL ADAPTIVE ALGORITHM AND ITS APPLICATIONS

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ABSTRACT. A solution-adaptive algorithm is presented. The framework of this method consists of an adaptive local stencil refinement algorithm and 3-points central difference discretization. The adaptive local stencil refinement is designed in such a manner that 5-point symmetric stencil is guaranteed at each interior node, so that conventional finite difference formula can be easily constructed everywhere in the domain. Thus, high efficiency and accuracy of central difference scheme can be ultimately enjoyed together with the solution-adaptive property. As increase of refinement levels, two types of stencils are appeared alternatively. The stencil adaptive algorithm can be combined with other numerical approaches such as mesh-free method and lattice Boltzmann method to simulate flows around curved boundaries. Numerical results indicate that the method is very efficient and effective in solving incompressible viscous flows.

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