

A new nine-point multigrid V-cycle algorithm

ABSTRACT

A new multigrid scheme using half sweep nine-point finite difference approximation in solving the two dimensional Poisson equation is presented. The concept of half sweep multigrid was initiated by Othman and Abdullah (1997) where promising results was established and confirmed. The five-point method was shown to be very much faster compared to the fullsweep multigrid method due to Gupta et al. (1995). In this paper, we apply the multigrid V-cycle algorithm on the nine-point finite difference approximation derived from the rotated nine-point stencil (Ali & Abdullah 1998). This nine-point finite difference approximation has been proven to be a viable Poisson solver with second order accuracy. Using different grid sizes, the efficiency of this multigrid scheme is compared with the fullsweep multigrid derived from the standard nine-point stencil (Adams et al. 1988) in terms of execution times and maximum error.

Keyword: Multigrid V-cycle algorithm; Nine-point finite difference