

**PARALLEL COMPUTING ON THE NAVIER-STOKES SOLVER
WITH THE MULTIGRID METHOD**

Kiattisak Ngiamsoongnirn^{*}, Ekachai Juntasaro^{*}, Varangrat Juntasaro^{**}
and Putchong Uthayopas^{***}

^{*}School of Mechanical Engineering, Institute of Engineering,
Suranaree University of Technology, Nakhon Ratchasima, Thailand,

Phone: (044)224410-2, Email: junta@sut.ac.th

^{**}Department of Mechanical Engineering, Faculty of Engineering,
Kasetsart University, Bangkok, Thailand, Phone: (02)9428555 ext 1829, Email: ovrsk@ku.ac.th

^{***}Department of Computer Engineering, Faculty of Engineering,
Kasetsart University, Bangkok, Thailand, Phone: (02)9428555 ext 1416, Email: pu@ku.ac.th

Abstract

This paper is aimed to present the combination of the parallel computing and the multigrid method on the Navier-Stokes solver. The combination is based on the concept of the objected-oriented programming (OOP), which is consisted of the 3 independently separate modules: Navier-Stokes, Multigrid and Parallel module. The multigrid method is implemented by employing the full approximate scheme (FAS) for numerically solving the non-linear Navier-Stokes equations. The overall computation is performed by using the parallel computing in which many numbers of computers are concurrently computed for the same task but on different sub-data. The second-order upwind differencing scheme is used for discretising the convective terms to obtain more accurate solutions. The two-dimensional laminar flow in a cavity is used as a test case. It is found that the computational time is decreased when employing the combination of the multigrid method and the parallel computing.

Published in : The 17th Conference of Mechanical Engineering Network of Thailand (ME-NETT 17), KMITNB-Prachinburi, Thailand, October 15-17, 2003.