

25th International Conference on Parallel Computational Fluid Dynamics 2013

(ParCFD2013)

Procedia Engineering Volume 61

**Changsha, China
20-24 May 2013**

Editors:

**Kenli Li
Matthew Smith
Mariano Vazquez**

ISBN: 978-1-63266-327-6

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© by Elsevier B.V.
All rights reserved.

Printed by Curran Associates, Inc. (2014)

For permission requests, please contact Elsevier B.V.
at the address below.

Elsevier B.V.
Radarweg 29
Amsterdam 1043 NX
The Netherlands

Phone: +31 20 485 3911
Fax: +31 20 485 2457

<http://www.elsevierpublishingsolutions.com/contact.asp>

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Perface for 25th ParCFD Conference	1
<i>N/A</i>	
3D LES Prediction of Unsteady Pressure on a Circular Cylinder at $Re=4.1 \times 10^4$	2
<i>Zhiwen Zhu, Zhengqing Chen</i>	
CFD High-order Accurate Scheme JFNK Solver	9
<i>Wei Liu, Li-Lun Zhang, Ying Zhong, Yong-Xian Wang, Yong-Gang Che, Chuan-Fu Xu, Xing-Hua Cheng</i>	
Some Adaptive Numerical Technology for Computational Aerodynamics	16
<i>V. Shaydurov, T. Liu</i>	
Numerical Simulation of Hypersonic Flow Around an Aerospace Plane by Parallel RANS based CFD	23
<i>Chao Wang, Feng Li, Zhi-Chao Ding, Liang Zhang</i>	
Aerodynamic Shape Optimization of Wind Turbine Blades Using a Parallel Genetic Algorithm	28
<i>Ozge Polat, Ismail H. Tuncer</i>	
Large Eddy Simulations of 2D and Open-tip Airfoils Using Voxel Meshes	32
<i>Mudunkotuwe Hitiwadi, Vidanelage Dulini, Yasara Mudunkotuwa, Kato Chisachi</i>	
Numerical Study of Chevron Jet Noise Using Parallel Flow Solver	40
<i>Hao Xia</i>	
Computational Analysis of High Speed Flow Over a Conical Surface with Changing the Angle of Attack	48
<i>K. Alhussan</i>	
Parallel Compressible Viscous Flow Simulations Using FLASH Code: Implementation for Arbitrary 3D Geometries	52
<i>Benzi John, David R. Emerson, Xiao-Jun Gu</i>	
Solving Two-dimensional Euler Equations on GPU	57
<i>Xiaofeng He, Zheng Wang, Tiegang Liu</i>	
Computation of Unsteady Incompressible Viscous Flows Using Kinetically Reduced Local Navier-Stokes Equations on a GPU	63
<i>T. Hashimoto, I. Tanno, Y. Tanaka, K. Morinishi, N. Satofuka</i>	
Extension of the Uniform Equilibrium Flux Method (UEFM) to Second Order Accuracy and its Graphics Processing Unit Acceleration	70
<i>Matthew R. Smith, Yen-Chih Chen, Ji-Ye Liu, Alexander Ferguson, Jong-Shin Wu</i>	
OpenCL Implementation of Basic Operations for a High-order Finite-volume Polynomial Scheme on Unstructured Hybrid Meshes	76
<i>S. A. Soukov, A. V. Gorobets, P. B. Bogdanov</i>	
An OpenCL-based Parallel CFD Code for Simulations on Hybrid Systems with Massively-Parallel Accelerators	81
<i>Andrey Gorobets, F. Xavier Trias, Assensi Oliva</i>	
Direct Numerical Simulation of Incompressible Flows on Unstructured Meshes Using Hybrid CPU/GPU Supercomputers	87
<i>G. Oyarzun, R. Borrell, A. Gorobets, O. Lehmkuhl, A. Oliva</i>	
Simulations of Three-Dimensional Cavity Flows with Multi Relaxation Time Lattice Boltzmann Method and Graphic Processing Units	94
<i>Hung-Wen Chang, Pei-Yao Hong, Li-Song Lin, Chao-An Lin</i>	
MRT-LBM Simulation of Four-Lid-Driven Cavity Flow Bifurcation	100
<i>Congshan Zhuo, Chengwen Zhong, Xixiong Guo, Jun Cao</i>	
Large-Eddy Simulation of Sand Streamers in Wind-Blown Sand	108
<i>Xiaoning Wang</i>	
Using Von Mises-Fisher Distribution for Polymer Conformation Analysis in Multi-Scale Framework	111
<i>Aidos Abzhanov, Bakytzhan Kallemov</i>	
Parallel Aspects of Fluid-Structure Interaction	117
<i>Eva Casoni, Guillaume Houzeaux, Mariano Vázquez</i>	
Shock Waves Propagation and Phase Transition in Single Crystal Iron under Ramp Compression: Large Scale Parallel NEMD Simulations	122
<i>Kun Wang, Shifang Xiao, Meng Liu, Huiqiu Deng, Wenjun Zhu, Wangyu Hu</i>	
Asynchronous Partial Update of Domain Decomposition Preconditioners to Solve Nonlinear CFD Problems	130
<i>L. Berenguer, D. Tromeur Dervout</i>	

Parallelization of Linear Iterative Methods for Solving the 3-D Pressure Poisson Equation Using Various Programming Languages	136
<i>Tingting Tang, Weiyun Liu, J. M. McDonough</i>	
A Parallel Discontinuous Galerkin Method with Physical Orthogonal Basis on Curved Elements	144
<i>Shujie Li</i>	
Hybrid OpenMP/AVX Acceleration of a Higher Order Quiet Direct Simulation Method for the Euler Equations	152
<i>Matthew R. Smith, Ji-Yueh Liu, Fang-An Kuo, Jong-Shin Wu</i>	
Investigation on Discontinuous Galerkin Solvers for Different Simulations	158
<i>Xiaohe Zhufu, Ruifeng Zhao, Jin Xu</i>	
High Performance Computing of the Flow Past a Circular Cylinder at Critical and Supercritical Reynolds Numbers	166
<i>Ivette Rodríguez, Oriol Lehmkuhl, Ricard Borrell, Leslye Paniagua, Carlos D. Pérez-Segarra</i>	
Efficient Simulation for Incompressible Turbulent Flow Using Lattice Boltzmann Model	173
<i>Takahiro Yasuda, Tomohisa Hashimoto, Hisato Minagawa, Koji Morinishi, Nobuyuki Satofuka</i>	
New Differential Operators and Discretization Methods for Eddy-Viscosity Models for LES	179
<i>F. Xavier Trias, Andrey Gorobets, Hao Zhang, Assensi Oliva</i>	
Thermal Radiation of Explosion: Estimations of Risk of Thermal Defeat of People and Occurrence of Fires	185
<i>K. Alhussan</i>	
LES of the Flow Inside the Lower Plenum of an Advanced Gas-Cooled Reactor with Conjugate Heat Transfer	192
<i>Juan Uribe, Charles Moulinec, Mike Rabbitt, Richard Howard, David R. Emerson</i>	
Parallelization Strategy for the Volume-of-Fluid Method on Unstructured Meshes	198
<i>Ricard Borrell, Lluís Jofre, Oriol Lehmkuhl, Jesús Castro</i>	
Study on the Influence of Phase Change Rate on Cloud Cavitation	204
<i>Xianxian Yu, Yiwei Wang, Chenguang Huang, Tezhuan Du</i>	
Parallel 3D Numerical Simulation of Continuous Detonation Engine on Graphics Processing Units	207
<i>Meng Liu, Shuang Zhang, Jianping Wang</i>	
Large Eddy Simulation of Aerodynamics of a Flat Box Girder on Long-Span Bridges	212
<i>Zhiwen Zhu, Zhengqing Chen</i>	
Speaker Recognition based on a Novel Hybrid Algorithm	220
<i>Fan-Zi Zeng, Hui Zhou</i>	
Parallel Large Eddy Simulations of Wind Farms with the Actuator Line Method	227
<i>A. Baez-Vidal, O. Lehmkuhl, D. M. Valdivieso, C. D. Pérez Segarra</i>	
A Parallel Overlapping Curvilinear AMR Grids Management Tool based on PARAMESH	233
<i>Jian Zhang, Lei Zhang, Chaowei Jiang</i>	
Performance Analysis and Optimization of PalaBos on Petascale Sunway BlueLight MPP Supercomputer	241
<i>Min Tian, Weidong Gu, Jingshan Pan, Meng Guo</i>	
Parallel Adaptive Mesh Refinement Simulation of the Flow Around a Square Cylinder at Re = 22000	246
<i>Oscar Antepara, Oriol Lehmkuhl, Jorge Chiva, Ricard Borrell</i>	
Exploring the Thread-level Parallelisms for the Next Generation Geophysical Fluid Modelling Framework Fluidity-ICOM	251
<i>Xiaohu Guo, Gerard Gorman, Michael Lange, Lawrence Mitchell, Michèle Weiland</i>	
A Gluing Method for Non-Matching Meshes	258
<i>Guillaume Houzeaux, Beatriz Eguzkitza, Bela Soni, Hadrien Calmet, Shahrouz Aliabadi, Alister Bates, Denis Doorly, Mariano Vázquez</i>	
Application of Computational Fluid Dynamics to Simulate a Steady Airflow in All Regions of Chimpanzee's Nasal Cavity	264
<i>Kaouthar Samarat, Kiyoshi Kumahata, Sho Hanida, Takeshi Nishimura, Futoshi Mori, Shigeru Ishikawa, Teruo Matsuzawa</i>	
Numerical Simulation of 3D Unsteady Flow in Centrifugal Pump by Dynamic Mesh Technique	270
<i>Huang Si, Yang Fuxiang, Guo Jing</i>	
Large-Scale Parallel Computing for 3D Gaseous Detonation	276
<i>Cheng Wang, Yong Bi, Wenhui Han, Jianguo Ning</i>	
The Effect of Boundary Conditions for Highly Rarefied Gas Flow	284
<i>Olga Rovenskaya, Giulio Croce</i>	
Massively Parallel Industry-Strength Design of Aerodynamic Wings	292
<i>C. Popovich, N. Shapiro, B. Epstein, S. Peigin</i>	

Comparison of Different Wall Boundary Treatments for Preconditioning Method Coupled with Building-Cube Method	298
<i>Shibo Qi, Takashi Furusawa, Satoru Yamamoto, Kazuhiro Nakahashi</i>	
A Parallel VOF Method for Simulation of Water Impact on Rigid Structure	306
<i>Pingjian Ming, Yafei Jiao, Chuan Li, Wenping Zhang</i>	
Stimulate the Pollutants Transport in Tai Lake with Lattice Boltzmann Method	315
<i>Xia Lei, Yanchao Qiao, Ziqi Guo, Ye Tian</i>	
A Parallel Node-based Solution Scheme for Implicit Finite Element Method Using GPU	318
<i>Yong Cai, Guangyao Li, Hu Wang</i>	
A Newly Improved WENO Scheme and its Application to the Simulation of Richtmyer-Meshkov Instability	325
<i>Pei-Guang Zhang, Jian-Ping Wang</i>	
Numerical Simulation of Flow-induced Sound in Human Voice Production	333
<i>Petr Šidlof, Stefan Zörner, Andreas Hüppe</i>	
Flow Dynamics and Heat Transfer Characteristics of Upward Impinging Jets	341
<i>Chandra Shekhar, Koichi Nishino</i>	
Investigation of the Damping Moment Induced by a Forced Rolling Cylinder with Bilge Keels	347
<i>Deng Rui, Duan Wen-Yang, M. A. Shan</i>	
Direct Numerical Simulations for Flow and Noise Studies	356
<i>R. D. Sandberg</i>	
A Maximum Curvature Method for Predicting Transonic Buffet Onset Based on Steady Aerodynamic Parameters	363
<i>Liu Jinli, Yang Zhichun</i>	
A Study on PEMFC Performance and Faults Diagnosis Using FLUENT 3D Models	370
<i>Fenglai Pei, Hongxun Yuan, Tong Zhang, Su Zhou</i>	
Optimizing Particle Simulation for Kepler GPU	376
<i>Yoshiaki Hanada, Shinya Kitaoka, Ye Xinhua</i>	
GPU-Accelerated Algebraic Multigrid for Applied CFD	381
<i>Robert Strzodka, Jonathan Cohen, Stan Posey</i>	
Considerations for GPU Acceleration of Parallel CFD	388
<i>Stan Posey</i>	
Accelerated CFD Simulations Using Eulerian and Lagrangian Methods on GPUs	392
<i>Daniel Gaudlitz, Björn Landmann, Thomas Indinger</i>	
A NVIDIA Kepler Based Acceleration of PIC Method	398
<i>Minhua Wen, Zhanpeng Yu, Simon See, Peng Wang, Zehuan Wang, James Lin</i>	
A Parallel Adaptive Nonlinear Elimination Preconditioned Inexact Newton for Transonic Full Potential Flow Problems	402
<i>Feng-Nan Hwang, Yi-Cheng Su, Xiao-Chuan Cai</i>	
A Fully Implicit Domain Decomposition Method for Transport Problems on the Cubed-Sphere	403
<i>Haijian Yang, Chao Yang, Xiao-Chuan Cai</i>	
A Fully Implicit Domain Decomposition Algorithm for Discrete-Velocity BGK Equation	404
<i>Jizu Huang, Chao Yang, Xiao-Chuan Cai</i>	
Simulating 3D Flows Passing Wind Turbine Rotors with a Domain Decomposition Method on a Moving Domain	405
<i>Rongliang Chen, Zhengzheng Yan, Yubo Zhao, Xiao-Chuan Cai</i>	
Author Index	