

# Contents

## Principles and Realisation of Parallel Architectures

Achilles, A.-Chr.; Kutrib, M.; Worsch, Th. On Relations between Arrays of Processing Elements of Different Dimensionality .....	13
Döring, A. C. Deriving Invariants for Cellular Automata .....	21
Fleury, E.; Grammatikakis, M.; Kraetzel, M. Performance of STC104 vs. Telegraphos .....	29
Hartmann, P. Addressing of Components within Inhomogeneous Cellular Structures .....	38
Kanevski, Ju.; Maslennikov, O.; Sergyienko, A. Processor Array for Signal Computing and Numerical Applications .....	47
Kasche, B.; Fey, D. Principles for Optoelectronic 3D Architectures and Corresponding Algorithms to Calculate Standard Functions .....	59
Sampels, M. Cayley Graphs as Interconnection Networks: A Case Study .....	67
Tiountchik, A.A. Generalized Approach to the Design of VLSI Array Processors .....	77
<b>Systems Software</b>	
Bakhmurov, A.G.; Smeliansky, R.L. DYANA: An Environment for Distributed System Design and Analysis .....	85
Derezińska, A.; Sosnowski, J. Dissemination of Test Results in Multiprocessor Systems .....	93
Di Napoli, C.; Giordano, M.; Mango Furnari, M.; Mele, F.; Napolitano, R. CANL: A Language for Cellular Automata Network Modeling .....	101
Doroshenko, A.E. Models and Programming Abstractions for Dynamical Parallelization of Computation and Communication .....	112
Sanders, P. On the Efficiency of Nearest Neighbor Load Balancing for Random Loads .....	120

Yamauchi, T.; Nakaya, S.; Kajihara, N.	
SOP: An Adaptive Massively Parallel Computer and its Control-Data-Flow Based Compiling Method.....	128
<b>Algorithms</b>	
Alexandrov, V.N.; Megson G. M.	
Solving System of Linear Algebraic Equations by Monte Carlo Method on Regular Arrays.....	137
Brudaru, O.; Silion, R.	
Systolic Architectures for Fuzzy Arithmetic and Polynomials .....	147
Jelfimova, L.	
A New Fast Systolic Array for the Modified Winograd Algorithm .....	157
Kanevski, J.S.; Maslennikov, O.V.; Wyrzykowsky, R.	
Algorithm-Based Fault Tolerant Solution of Linear Systems on Processor Arrays .....	165
Koch, W.	
Efficient Reduce and Scan Functions for Mesh-Connected SIMD Computers .....	174
Nepomniaschaya, A.S.	
Representations of the Prim-Dijkstra Algorithm on Associative Parallel Processors .....	184
Okša, G.	
Fine Grained Systolic Toeplitz Solver .....	195
Scheetz, T.E.; Gannon, J.A.; Dietz, R.D.; Braun, T. A.; Casavant, T.L.; Andersland, M.S.	
Accounting for Uncertainty in the Recovery of Traces for Parallel Computing Systems .....	206
Zima, E.V.	
On Parallel Construction of Multidimensional Chains of Recurrences.....	214
Zimmermann, K.-H.; Achtziger, W.	
Synthesizing Regular Arrays from Single Affine Recurrences via Quadratic and Branching Parametric Linear Programming .....	224

## Applications

- Biewald, R.  
Real-time Navigation and Obstacle Avoidance for Non-Holonomic Mobile Robots Using a Human-Like Conception and Neural Parallel Computing ..... 232
- Gärtel, U.; Hess, R.; Joppich, W.; Mierendorff, H.; Schüller, A.  
Activities on Weather and Climate Prediction on Highly Parallel Machines ... 241
- Gubareny, N.; Katkov, A.  
Modelling of Distributed Processes for Image Reconstruction in Cellular Structure ..... 251
- Iliev, R.; Lazarov, V.; Kerridge, J.; England, R.; Boyanov, K.  
Discrete-event Simulation of a Parallel Database Machine..... 259
- Kerridge, J.; England, R.; Yanev, S.; Boyanov, K.; Sinyagina, N.  
Speedup Image Processing..... 269
- Lirkov, I.; Margenov, S.  
Parallel Complexity of Conjugate Gradient Method with Circulant Preconditioners..... 279

## Poster Session

- Adamatzky, A.  
Reaction-Diffusion Computer: Massively Parallel Molecular Computation .... 287
- Bakalov, Yu.V.; Smelianski, R.L.  
A Language for Specifying Distributed Program Behavior ..... 291
- Burg, H.C.  
Mapping Based on Combinatorial Designs ..... 293
- Di Gregorio, S.; Rongo, R.; Serra, R.; Spataro, W.; Spezzano, G.; Talia, D.;  
Villani, M.  
Parallel Simulation of Soil Contamination by Cellular Automata ..... 295
- Fabero J.C.; Bautista, A.; Casasús L.  
Cellular Automata in the Simulation of Wave Propagation in Solids ..... 298
- Gruska, D.P.  
Process Algebra for Shared Resources ..... 300
- Hochberger, C.  
Automatic Generation of two Phased Models with CDL ..... 302

Kaliaev, I.A.	
Superperformance Homogeneous Neurolike Structures in Systems of Optimum Decision Selection .....	304
Khoroshevsky, V.G.	
MICROS: Large-Scale Distributed Computer Systems with Programmable Structure .....	306
Lutsyk, A.; Schmojlov, V.; Zayats, I.	
Programming Tools for Tuning Homogeneous Computing Structures .....	309
Markova, V.	
3D Cellular Pipelined Algorithm for Many Number Pairs Multiplication.....	312
Merrall, S.	
Enhancing Data Parallel Programming with Active Data Structures .....	315
Palenichka, R. ; Zinterhof, P.	
Recursive Algorithms for Low-Level Computer Vision Using Order Statistics .....	317
Sanders, P.	
Optimizing the Emulation of MIMD Behavior on SIMD Machines .....	320
Schneider, R.; Hoffmann R.	
A Mapping Strategy for Cellular Models to Different Parallel Target Architectures .....	322
Schmojlov, V. ; Zayats, I.; Lutsyk, A.	
Fundamental Principles of Homogeneous Computational Structures .....	324
Thor, M.	
Multi-Processor, Reconfigurable Architecture Increasing Performance of Distributed Object-Oriented Programs .....	327
<b>Invited Paper</b>	
Hoppe, H.-C.	
The Message-Passing Interface - Design, Status and Perspective .....	330