

Conference Technical Program Overview

| Monday, 6 September | Tuesday, 7 September | Wednesday, 8 September |
|--|---|--|
| 09:00 – 11:00 Registration | 09:00 – 10:30 Plenary Session II | 09:00 – 10:00 Special Session (panel discussion): <i>International Collaboration</i> |
| 11:00 – 11:15 Opening Ceremony | | 10:00 – 11:40 Session 7: <i>Engineering computing</i> |
| | <i>Tea Break</i> | <i>Tea Break</i> |
| 11:15 – 12:45 Plenary Session I | 11:20 – 13:00 Session 3 and 4: <i>Intelligent computing</i> | 12:00 – 13:00 Session 8: <i>Health care and ecology</i> |
| <i>Lunch</i> | <i>Lunch</i> | <i>Lunch</i> |
| 14:00 – 16:00 Session 1: <i>HPC computing with applications</i> | 14:00 – 16:20 Session 5: <i>IT in decision support</i> | 14:00 – 16:20 Session 9: <i>Graphic and multimedia data processing</i> |
| <i>Tea Break</i> | <i>Tea Break</i> | <i>Tea Break</i> |
| 16:20 – 17:40 Session 2: <i>New approaches to HPC computing</i> 18:00 – late Welcome reception | 16:40 – 18:20 Session 6: <i>Signal processing</i> | 1620 – 1740 Session 10: <i>Simulators</i> |

Conference Tour and Dinner:

The conference gala dinner and a city tour are scheduled on Thursday 9 September 2010 starting from 7pm. Tour bus will depart the FEB RAS Presidium at 7pm. Address: 50 Svetlanskaya Street, Vladivostok. (Россия, г. Владивосток улица Светланская, 50).

Conference Committee

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Prof. Yu. Kulchin

*Director of the Institute for Automation and Control Processes
Russian Academy of Sciences, Far Eastern Branch
Corresponding Member of Russian Academy of Sciences
Vladivostok, Russia*

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Russian Academy of Sciences, Far Eastern Branch

Conference Sponsors

The conference is sponsored by the Institute for Automation and Control Processes, Far Eastern Branch of Russian Academy of Sciences, IBM East Europe Division, Academic Alliance International, IEEE Russia Siberian Section and IEEE NSW Section.

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(in conjunction with ICITA Committee)

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Conference Chairman's Message

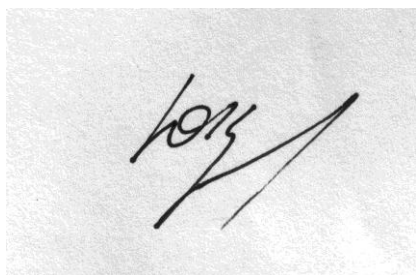
The end of 20th and the beginning of 21st century has been marked with ubiquitous computerisation in all spheres of human activity, from traditional intellectual tasks of a scientific nature to automation of production, commerce, banking and many more activities.

Modern Information Technology, with its rapidly growing potential, opens great new opportunities and enables new approaches in manpower organisation and occupation. Also, today, Information Technology, by providing new opportunities for the growth of productivity and scale of production, wipes out all geographical barriers for human relations.

The development of Information Technology in the Russian Far East has received great attention. The Far East Branch of Russian Academy of Sciences is a leader in developing modern IT. Therefore the choice of Vladivostok as the place to conduct this 1st Russia and Pacific Conference on Computer Technology and Applications is very appropriate, and the scope of this conference is very exciting.

We expect that this conference will be the first step in establishing fruitful scientific cooperation between researchers of Asian-Pacific region who are solving theoretical and applied problems in Information Technology.

Thank you all for the participation in the conference and welcome to Vladivostok --- the capital for Far Eastern Science in Russia.

A handwritten signature in black ink on a light-colored background. The signature is stylized and appears to be 'Yu. Kulchin'.

Prof. Yu. Kulchin
*Director of the Institute for Automation and Control Processes
Russian Academy of Sciences, Far Eastern Branch
Corresponding Member of Russian Academy of Sciences
Vladivostok, Russia*

Conference Registration

The registration desk will be open during the following time:

- Monday 06 September 2010 9:00 AM - 4:00 PM
- Tuesday 07 September 2010 9:00 AM - 4:00 PM
- Wednesday 08 September 2010 9:00 AM - 10:00 AM

During the tea and lunch break, tea/coffee/refreshments/lunch will be served.

Conference dinner will held on Tuesday, 07 September 2010.

General Information

Conference Venue

The conference venue is at the FEB RAS Presidium, Russian Academy of Sciences, Far Eastern Branch. Address: 50 Svetlanskaya Street, Vladivostok. (Россия, г. Владивосток улица Светланская, 50)

Conference Dates

6 – 8 September 2010

Official Language

The official language of the conference is English.

Name Tags

Please ensure name tags are worn at all times during the conference.

Paper Presentation Guidelines

Each presentations is set at 20 minutes which includes a 5 minutes for questions and answers. It is recommended that the number of presentation slides is to be around 15 to bring the presentation time well within 20 minutes.

Each session room is equipped with a computer and a projector. For oral presentation, authors please load up their power point presentation files 10 minutes before the session starts, or use their own laptop computers for the presentation. Authors are requested to report to the session room to meet the Session Chairperson 5 minutes before the session starts. Each author is to prepare a 20 - 30 words brief biography to be given to the Session Chairperson before the session starts.

For poster session, authors are required to set up their posters on the allocated positions 5 minutes before the session starts.

Session Chairperson

Session Chairpersons please identify the presenting authors 5 minutes before the session starts. Each presenting author will need to provide his/her own brief biography. Please mark the no-show paper on the session report.

Visitor's Information

Most of the information on travel to Vladivostok can be found at the website:
<http://wikitravel.org/en/Vladivostok>

Conference Venue on Map



- 1 - Conference place**
- 2 - Hyundai hotel**
- 3 - Versal hotel**
- 4 - Amur Bay hotel**
- 5 - Equator hotel**
- 6 - Vladivostok hotel**

Monday, 6 September 2010

Opening Ceremony

11:00 – 11:15am

Welcome address

Valentin Ivanovich Sergienko

Academician and President of

Far Eastern Branch, Russian Academy of Sciences

Vladivostok, Russia

Chairman: Errol Chopping

Plenary Session I

11:15 – 12:45

Chairman: Errol Chopping

Computing in a Real World

Dr Andrew Lewis

Griffith University, Queensland, Australia

Advanced technologies for cloud computing

IBM East Europe / Asia

Russia

Lunch

13:00 - 14:00

Session 1: HPC computing with applications

Monday, 6 September 2010; Time: 14:00 - 16:00

Chairman: Evgeny Nurminskiy

1.1

Paper ID: 03-jp-Mavlonov

Auxons: A large scale distributed storage system for semi-structured data

Kamoliddin Mavlonov, Kouji Hirata, Yoshinobu Higami, Shin-ya Kobayashi

Ehime University, Japan

1.2

Paper ID: 04-ru-Alekseev

Numerical Solution of Boundary Control Problems for Heat Convection Models

Alekseev G. V., Tereshko D. A.

Institute for Applied Mathematics, FEB Russian Academy of Sciences

Vladivostok, Russia

1.3

Paper ID: 04-ru-Lutsenko

Parallel Implementation of Algorithm for Calculation of Gas Flow through Porous Media with Heat Sources

Lutsenko N., Miroshnichenko N., Odyakova D., Kharitonov D.

Institute for Automation and Control Processes, FEB Russian Academy of Sciences

Vladivostok, Russia

1.4

Paper ID: 04-ru-Smirnov

Parallel Implementation of One Numerical Free-Surface Ocean Model

Smirnov S. V.

Institute for Automation and Control Processes, FEB Russian Academy of Sciences

Vladivostok, Russia

1.5

Paper ID: 04-ru-Kashirin

On Numerical Solution of Three-dimensional Diffraction Problems in the Integral Form

Alexey A. Kashirin, Sergey I. Smagin

Computing Center, FEB Russian Academy of Sciences

Vladivostok, Russia

1.6

Paper ID: 04-ru-Luniakov

Application of high performance computing to calculations of vacancy minimum energy paths on the defect surface Si(111)- $\sqrt{3}\times\sqrt{3}$ -In

Lunyakov Yu V.

Department of Surface Physics of the Institute

Institute for Automation and Control Processes, FEB Russian Academy of Sciences

Vladivostok, Russia

1.7

Paper ID: 04-ru-Gassan

Parallel implementation of the algorithm for calculating local minima of integral lattices

Gassan S. V.

Institute for Applied Mathematics, FEB Russian Academy of Sciences

Vladivostok, Russia

16:00 - 16:20 Coffee break

Session 2: New approaches to HPC computing

Monday, 6 September 2010; Time: 16:20 – 17:40

Chairman: Yui Hiroaki

2.1

Paper ID: 06-ru-Khanchuk

Regional network of the Far Eastern Branch of RAS.

Khanchuk A. I., S. I. Smagin, A. A. Sorokin, S. V. Makogonov

Academician and Director of the Far Eastern Geological Institute

FEB Russian Academy of Sciences

Vladivostok, Russia

2.2

Paper ID: 04-ru-Nurminskiy

GPU-based HPC for solution of some large-scale polyhedral least distance problems
Nurminskiy E. A., Poznyak P. L.
Institute for Automation and Control Processes, FEB Russian Academy of Sciences
Vladivostok, Russia

2.3

Paper ID: 17-04-ru-Bobkov

GPU Implementation of Depth Map Algorithm

Bobkov V. A., Ronshin Yu. I.

Institute for Applied Mathematics, FEB Russian Academy of Sciences
Vladivostok, Russia

2.4

Paper ID: 04-ru-Shapovalov

Genetic Algorithm Based Parallel Jobs Scheduling

Shapovalov T. S., Tarasov A. G.

Computing Center, FEB Russian Academy of Sciences
Vladivostok, Russia

2.5

Paper ID: 12-10-ru-Kuznetsov

Diagnostic application in the heat-power engineering

Kuznetsov R.S.

Institute for Automation and Control Processes, FEB Russian Academy of Sciences
Vladivostok, Russia

2.6

Paper ID: 04-ru-Tarasov

Tarasov A.G.

Integration of computing cluster monitoring system

Parallel computing group, FEB Russian Academy of Sciences
Vladivostok, Russia

Tuesday, 7 September 2010

Plenary Session II

09:00 – 10:00

Chairman: Valeria Gribova

PS II - 1

Educational and knowledge tools

IBM East Europe / Asia

Russia

PS II – 2

Open standards as a basis for integration of geospatial data into information infrastructure

Sergey M. Krasnopeyev, Pavel P. Moiseyets, Sergey S. Pashinskii, Victor V. Savkin

Pacific Institute for Geography, FEB Russian Academy of Sciences

Vladivostok, Russia

PS II - 3

Research Arrangement for Ecological Control of Peter the Great Bay

A. I. Alexanin, V. A. Kachur, T. Yu. Orlova, A. N. Pavlov, P.A. Salyuk

Institute for Automation and Control Processes, FEB RAS

Institute for Marine Biology, FEB RAS

Pacific Oceanological Institute, FEB RAS

Coffee break 10:30-10:50

Session 3: Intelligent computing

Tuesday, 7 September 2010; Time: 10:50 – 13:00

Chairman: Privesetsev A

3.1

Paper ID: 01-ru-Artemieva

Multilevel Modular Chemistry Ontology: Structure and Management

Artemieva I. L.

Institute for Automation and Control Processes, FEB Russian Academy of Sciences

Vladivostok, Russia

3.2

Paper ID: 11-11-au-Tien

Support Tools for Spatial Data Mining: LiDAR and Applications

David Tien.

Charles Sturt University,

Australia

3.3

Paper ID: 03-ru-Kulik

Algebraic Method of Intelligent Data and Knowledge Processing

Kulik B. A., Fridman A. Ya, Zuenko A. A.

*Institute for Problem Solving in Machine Science, Russian Academy of Sciences
St. Petersburg, Russia*

3.4

Paper ID: 03-52-ru-Gribova

Evolution of the ontology-based approach to automatic generation of user interfaces with dynamic data

Gribova V. V. Cherkezeshvili N. N.

*Institute for Automation and Control Processes, FEB Russian Academy of Sciences
Vladivostok, Russia*

4.1

Paper ID: 03-31-jp-Suzuki

New Multivalued Logic System in Boolean Class by Regarding Fixed-point Binary Numbers as Truth Values

Hisashi Suzuki and Kin-ya Sugimoto

Chuo University, Japan

4.2

Paper ID: 04-ru-Artemieva

Parallel Logical Inference for Confluent Rule-Based Systems

Irina Artemieva, Mikhail Tyutyunnik

*Institute for Automation and Control Processes, FEB Russian Academy of Sciences
Vladivostok, Russia*

4.3

Paper ID: 03-ru-Shalfeeva

Monitoring of conceptual information resources for intelligent software systems

Shalfeeva E.A.

*Institute for Automation and Control Processes, FEB Russian Academy of Sciences
Vladivostok, Russia*

4.4

Paper ID: 03-ru-Timchenko

The concept of information transformation tool based on mapping of graph structures

Knyazeva M.A., Timchenko V.A.

*Far Eastern National University
Vladivostok, Russia*

4.5

Paper ID: 01-011-ru-Fazliev

Ontology for Water Spectroscopy Information Resources

Privesetsev A., Fazliev A., Tsarkov D., Tennyson J.

*Institute for Atmospheric Optics,
Tomsk, Russia*

Lunch 13:00-14:00

Session 5: IT in decision support

Tuesday, 7 September 2010; Time: 14:00 - 16:20

Chairman: Velichko A. S.

5.1

Paper ID: 03-jp-Hiroaki

Reduced Operation Size for Chord Method Applying Partially solving Method

Yui Hiroaki, Osana Minetada

The University of Aizu

Japan

5.2

Paper ID: 03-025-au-Lewis

Correcting Response Failure Errors in Multi-Objective Optimisation in Unreliable Distributed Computing Environments

Rawlins T., Lewis A.

Institute for Integrated and Intelligent Systems

Griffith University, Queensland

Australia

5.3

Paper ID: 16-ru-Shekhunov

Problems of container terminal management systems automation

Shekhunov S. V.

Far Eastern National University

Vladivostok, Russia

Russia

5.4

Paper ID: 16-ru-Abramov

Decision support systems in transport logistics

Abramov A. L., Kovtanyuk A. A.

Institute for Mathematics and Computer Science

Far Eastern National University

Vladivostok, Russia

5.5

Paper ID: 07-ru-Burago

Automatic Generation of Enumeration Problems

Burago I.V., Shevchenko I.I.

Abramov A. L., Kovtanyuk A. A.

*Institute for Mathematics and Computer Science
Far Eastern National University
Vladivostok, Russia*

5.6

Paper ID: 12-ru-Danielyan

Dispatching in heat-and-power engineering

Danielyan S.A.

Institute for Automation and Control Processes, FEB Russian Academy of Sciences

Vladivostok, Russia

5.7

Paper ID: 11-ru-Nedoluzhko

An approach used to integrate into European Space Agency's Service Support Environment using Semantic Web standards

Nedoluzhko I. V., Pozdnyak P. L., Bury A. A.

Institute for Automation and Control Processes, FEB Russian Academy of Sciences

Vladivostok, Russia

Coffee break 16:20 – 16:40

Session 6: Signal processing

Tuesday, 7 September 2010; Time: 16:40 - 18:20

Chairman: David Tien

6.1

Paper ID: 18-12-ru-Kropotov

Management of the channel suppression hindrances in multichannel systems of transfer acoustic signals

Kropotov Yu. A.

Vladimir State University

Khabarovsk, Russia

6.2

Paper ID: 18-ru-Linnik

Acoustic communication system for underwater vehicle telecommunication

Linnik M. A., Karabanov I. V., Mironov A. S., Burdinskiy I. N.

Pacific National University

Khabarovsk, Russia

6.3

Paper ID: 18-ru-Karabanov

Threshold Methods of Sonar Pseudonoise Phase-shift Signal Detection

Karabanov I. V., Linnik M. A., Burdinskiy I. N.

Pacific National University

Khabarovsk, Russia

Wednesday, 8 September 2010

Special Session: International Collaboration

09:00 – 10:00

Chairman: Errol Chopping

Session 7: Engineering computing

Wednesday, 8 September 2010; Time: 10:00 - 11:40

Chairman: Filaretov

7.1

Paper ID: 12-51-ru-Devyatisilniy

The Method for Construction of the Two-Dimensional Gravi-Inertial System Based on D'Alembert's Principle

Devyatisilniy A. S., Chislov K. A.

*Institute for Automation and Control Processes, FEB Russian Academy of Sciences
Vladivostok, Russia*

7.2

Paper ID: 12-52-ru-Devyatisilniy

Pseudospectrums and Linear Systems Stability

Devyatisilniy A. S., Kislov K. A.

*Institute for Automation and Control Processes, FEB Russian Academy of Sciences
Vladivostok, Russia*

7.3

Paper ID: 12-ru- Chemeris

The guidance and positioning system based on the video processing

Chemeris D. S., Burdinsky I. N.

*Pacific National University (PNU),
Khabarovsk, Russia*

7.4

Paper ID: 12-ru-Lebedev

The Synthesis of Multi-Channel Adaptive Control System for the Autonomous Underwater Robot

Lebedev A. V.

*Robotics Laboratory, Institute for Automation and Control Processes
FEB Russian Academy of Sciences
Vladivostok, Russia*

7.5

Paper ID: 12-ru-Eremin

Digital algorithms for robot-manipulator cyclic control system

Eremin E. L., Shelenok E. A.

Pacific National University

7.6

Paper ID: 03-cn-Ramirez

Satellite Thermal Control Analytical Time-Dependent Model for Satellite Thermal Balance

Leopoldo Ramirez, Wang Jun, Liu Quojing

Beijing University of Aeronautics and Astronautics

China

Session 8: Health care and ecology

Wednesday, 8 September 2010; Time: 12:00 - 13:00

Chairman: Filaretov

8.1

Paper ID: 14-02-ru-Moskalenko

An implementation of the computer knowledge bank on medical diagnostics for ophthalmology

Moskalenko Ph. M., Chernyakhovskaya M. Yu.

Institute for Automation and Control Processes, FEB Russian Academy of Sciences

Vladivostok, Russia

8.2

Paper ID: 14-ru-Mikheev

Solution for Gentle Microcirculation Diagnosis for Infants and Non-transportable Patients

Mikheev O. V., Konstantinov O. G., Pavlov A. N., Pavlov V. A., Usov V. V., Obidennikova T. N.

BearingPoint, Moscow,

Russia

8.3

Paper ID: 19-ru-Vorontsova

Mathematical modeling of abundance dynamics for zooplankton community in aquatic ecosystems

Vorontsova E. A.

Institute for Automation and Control Processes, FEB Russian Academy of Sciences

Vladivostok, Russia

Lunch 13:00 – 14:00

Session 9: Graphic and multimedia data processing

Wednesday, 8 September 2010; Time: 14:00 - 16:20

Chairman : Bobkov V.A.

9.1

Paper ID: 11-19-ru-Aleksanin

Automatic Computation of Tropical Cyclone Tracks on Geostationary Satellite Imagery

Alexanin A.I., Eremenko A.S., Bolovin D.A., Dyakov S.A.

Institute for Automation and Control Processes, FEB Russian Academy of Sciences

Vladivostok, Russia

9.2

Paper ID: 19-ru-Zagumyonov

Automatic ocean eddy detection on satellite imagery on the base of dominant orientations of thermal contrasts

Alexanin A. I., Zagumyonov A. A.

*Institute for Automation and Control Processes, FEB Russian Academy of Sciences
Vladivostok, Russia*

9.3

Paper ID: 05-ru-Borodulin

Capture Techniques Capable of High Dynamic Range Image

Borodulin V. V., Mukha V. A., E. Mikhailov E. V.

Pacific National University

Khabarovsk, Russia

9.4

Paper ID: 05-ru-Pereguda

Fractal processing of multimedia data

Pereguda E. S.

*Development Department, Portal Khabarovsk,
Khabarovsk, Russia*

9.5

Paper ID: 15-05-ru-Bahrushin

High Embedding Capacity and Low Distortion Watermarking Scheme

Bahrushin A.P., Bahrushina G.I., Tsoy R.I.

Russia

9.6

Paper ID: 17-ru-May

The system for volume visualization of computer tomography objects

May V.P., Melman S.V.

Russia

9.7

Paper ID: 17-ru- Konstantinov

Reconstruction of three-dimensional models of buildings based on a set of Photographs

Kudryashev A. P.

Russia

Session 10: Simulators and diagnostic tools

Wednesday, 8 September 2010; Time: 16:20 – 17:40

Chairman: Artemieva I. L.

10.1

Paper ID: 03-51-ru-Gribova

The concept of an intelligent tool for development of diagnostic computer simulators

Gribova V. V.
Institute for Automation and Control Processes, FEB Russian Academy of Sciences
Vladivostok, Russia

10.2

Paper ID: 12-ru-Filaretov

Matlab using in software for visual simulation of multilink manipulators dynamics
Filaretov V.F., Yukhimets D.A., Mursalimov E.Sh.
Institute for Automation and Control Processes, FEB Russian Academy of Sciences
Vladivostok, Russia

10.3

Paper ID: 03-ru-Kulchin

Complexes of neural networks for information processing in distributed fiber-optical measuring systems
Kulchin Yu. N., Zakasovskaya E. V.
FEB Russian Academy of Sciences and Far Eastern State University
Vladivostok, Russia

10.4

Paper ID: 15-ru-Voloshin

Automation system of monitoring and dispatching of the server room
Voloshin E.V., Buzhjenik D.I.
Institute for Automation and Control Processes, FEB Russian Academy of Sciences
Vladivostok, Russia

10.5

Paper ID: 14-ru-Bogdanov

Information-analytical systems for monitoring, control and analyzing of power engineering
Bogdanov Yu. Yu., Chipulis V. P.
Institute for Automation and Control Processes, FEB Russian Academy of Sciences
Vladivostok, Russia

Closing

03-jp-Mavlonov

A large scale distributed storage system for semi-structured data

Kamoliddin Mavlonov, Kouji Hirata, Yoshinobu Higami, Shin-ya Kobayashi
Ehime University, Japan

Abstract—Auxons is a non-relational column-based distributed storage system for managing a very large amounts of semistructured data to scale out among thousands of commodity servers, while providing high availability and high performance. In many ways Auxons is simple and flexible compare to RDBMS:

to leave a complex, often-unused RDBMS features, schema free, elastic table evolving, and no pre-defined data formats (everything is string). Adding, editing and retrieving the data through a simple set of API calls. In practice this type non-relational storage systems are used for cloud services, though they typically do not support ACID transaction and with a goal of massive scaling. In this paper, we describe the design and implementation of Auxons as our solution of middleware for cloud services.

04-ru-Alekseev

Numerical Solution of Boundary Control Problems for Heat Convection Models

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Abstract—This work is concerned with a numerical solution of multi-objective optimal control problems for a stationary model of heat transfer. The model consists of the Navier-Stokes equations and the convection-diffusion equations for temperature that are nonlinearly related via buoyancy in the Boussinesq approximation and via convective heat transfer. The velocity of fluid and the heat flux on some parts of the boundary are used as controls when minimizing a quadratic functional depending on the velocity and temperature. Boundary control problems for the stationary Boussinesq equations are formulated. Solvability results for these problems are presented and the optimality systems are deduced. Numerical algorithm based on Newton's method for the optimality system and finite element method for linearized heat convection problem is proposed. Some computational results connected with the vortex reduction in the flow around a cylinder in plane channels are given and analyzed.

Index Terms —Heat convection, flow control.

04-ru-Lutsenko

Parallel Implementation of Algorithm for Calculation of Gas Flow through Porous Media with Heat Sources

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Institute for Automation and Control Processes FEB RUS

Abstract—A parallel computational algorithm for researching of two-dimensional (plane and axially symmetric) unsteady gas flows through a porous media of complex shape with energy sources has been developed. It has been shown that object-oriented approach made it possible to develop a distributed computational algorithm and to automate definition assignment of the object geometry without essential changes of code. Calculations have been carried out on the multiprocessor computer MPC-15K. The parallel algorithm efficiency has been analyzed.

Index Terms —Parallel algorithms, computational modeling.

04-ru-Smirnov

Parallel Implementation of One Numerical Free-Surface Ocean Model

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Abstract—This paper presents the development of a free-surface three-dimensional oceanographic model, for the use on cluster computers. The s-coordinate, free surface model is based on full nonlinear primitive equations of the ocean. Numerical integration procedure is based on time-splitting method with Robert-Asselin filtering. Parallelism is provided via high-level message-passing routines. The resulting numerical code allows an efficient use of a cash memory to minimize processor-memory data exchange.

Index Terms —numerical model, ocean, parallel.

04-ru-Kashirin

On Numerical Solution of Three-dimensional Diffraction Problems in the Integral Form

Alexey A. Kashirin and Sergey I. Smagin

Computing Center FEB RAS 65, Khabarovsk

Abstract—Questions of solution of three-dimensional diffraction problems are considered. Each problem is formulated as a single weakly-singular integral equation of the 1st kind for a single unknown function. Discretization of these equations is realized by means of special smoothing method of integral operators kernels. Numerical solutions of systems of linear algebraic equations, approximating integral equations of diffraction problems, are calculated by using of the variational iterative method and parallel computing technology. We have presented results of numerical experiments.

04-ru-Luniakov

Application of high performance computing to calculations of vacancy minimum energy paths on the defect surface $\text{Si}(111)\sqrt{3}\times\sqrt{3}\text{-In}$

Yuri Luniakov

Russian Academy of Sciences, Russia

Abstract—initio program VASP and high performance cluster computer we have carried out the first-principle simulation of the movement of In vacancy on the defect $\text{Si}(111)\sqrt{3}\times\sqrt{3}\text{-In}$ surface. The energy barrier for In movement from one equilibrium position to another is shown to be about 0.75 eV that is too high to be observed experimentally at the reasonable temperatures. The form of the trajectory of In vacancy movement is shown to make the low influence on the energy barrier height.

Index Terms —ab-initio, indium, silicon, surface, VASP.

06-ru-Khanchuk

Regional Network of the Far Eastern Branch of RAS

A.I. Khanchuk, S.I. Smagin, A.A. Sorokin, S.V. Makogonov

FEB RAS

CC FEB RAS

Abstract—Regional computer network has been established in the Far Eastern Branch of RAS. It connects all the scientific centers of the Branch and provides operations of basic network services, and a number of corporate services (Grid system, videoconferencing system, data centers, etc.). The growing number of users and traffic on the network, the appearance of new services (e.g. distributed databases and computing systems), puts the task of development of the existing information and telecommunication infrastructure to meet these new requirements. The paper describes the Network and the prospects of its development.

Index Terms —Network, FEBRAS, development.

04-ru-Nurminski

GPU-based HPC for solution of large-scale polyhedral least distance problems.

E.A. Nurminski, P.L. Pozdnyak

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Abstract—We present an implementation of the suitable affine subspaces method on GPU. The modification at algorithm scheme and details of CUDA modeling are described and results of numerical experiments are presented. Compared to common CPU the speedup is about tenfolds for the problems up to dimensions 105.

Index Terms — projection, GPU

17-04-ru-Bobkov

GPU Implementation of Depth Map Algorithm

V.A. Bobkov, Y.I. Ronshin

Abstract—The algorithm for construction of depth maps from multiple images and its implementation on GPU with CUDA is described. It is based on application of space-sweep strategy and adaptive window-based technique. The evaluation of two versions of algorithm on CPU and GPU was executed.

Index Terms —3D reconstruction, depth map, GPU computing, CUDA.

04-ru-Shapovalov

Genetic Algorithm Based Parallel Jobs Scheduling

Taras S. Shapovalov, Alexey G. Tarasov

Abstract—Solution of parallel jobs scheduling problem is crucial for distributed computing systems performance. In this paper genetic algorithm approach is suggested for parallel job's start time scheduling in computing Grid environment. Suggested algorithm performs initialization with help of widely used Backfill algorithm. Also, squeeze genetic operator for parallel jobs scheduling problem is introduced. Numerical experiments with different sets of jobs have been processed.

Results show, that genetic algorithm based approach may overcome Backfill based schedulers in certain cases.

Index Terms —Genetic algorithm, Backfill, Grid, parallel jobs scheduling, squeeze genetic operator.

04-ru-Gassan

Parallel implementation of the algorithm for calculating local minima of integral lattices

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Abstract—In the paper we consider the algorithm for finding local minima of integral lattices. We discuss the details of the software implementation (including the implementation for distributed computing) and ways of optimization. We also propose the modification of the algorithm for calculating elliptic minima and consider the application of these algorithms to computing parameters of Korobov's parallelepipedal grids.

Index Terms —integral lattices, local minima, lattice reduction, software implementation

01-ru-Artemieva

Multilevel Modular Chemistry Ontology: Structure and Management

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Abstract—The intellectual system for a domain with complicated structures is a knowledge-based system which allows to accumulate domain knowledge and provides an opportunity for domain specialists to use it to solve applied tasks. Such an intellectual system which will be practically useful for domain specialists should be upgradable and allow users to modify not only knowledge but domain ontology as well and, as a result, sets of applied task classes solved by the intellectual system. Therefore maintenance of the intellectual system is important and consists of its information and program components management. To solve a problem how one can manage an object, it is necessary to study properties of the object managed and problems to appear while managing. This article analyzes the structure of information components of the intellectual Internet system which should be practically useful for chemists and which should cover information of different chemistry subdomains. The article considers the special features of information components and their management. It describes the structure and terms of ontology with a higher level of generality (metaontology) which can be used to manage chemistry subdomain ontologies and to develop them.

Index Terms —Ontology for domain with complicated structure, Intelligent system, Multilevel domain ontology, Practically useful intelligent system.

03-ru-Kulik

Algebraic Method of Intelligent Data and Knowledge Processing

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Institute for Problems in Machine Science of RAS, RUSSIA

Kola Science Centre of RAS, RUSSIA

Abstract—The paper examines the usage potential of n-tuple algebra (NTA) developed by the authors as a theoretical generalization of structures and methods applied in intelligence systems. NTA supports formalization of a wide set of logical problems (abductive and modified conclusions, modelling of graphs, semantic networks, expert rules, etc.). This article mostly describes implementation of logical inference by means of NTA.

Index Terms —data processing, knowledge representation, intelligence system, logical inference, multiplace relation.

03-52-ru-Gribova

Evolution of the ontology-based approach to automatic generation of user interfaces with dynamic data

Valeria Gribova and Nickolay Cherkezishvili

Abstract—This paper presents an approach to the development and automatic generation of user interfaces with dynamic data. Interfaces with dynamic data have a changeable structure and a number of input/output data sets. Their development, implementation, and posterior modification require great efforts and takes a lot of time. The presented approach is the evolution of the ontology-based approach to development and automatic generation of user interfaces with static data. Fundamentals of the approach, components of a user interface model, and a basic architecture of a tool are described.

Index Terms —ontology, dynamic task models, dynamic user interfaces, user interfaces design.

03-31-jp-Suzuki

New Multivalued Logic System in Boolean Class by Regarding Fixed-point Binary Numbers as Truth Values

Hisashi Suzuki and Kin-ya Sugimoto
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Abstract—This article, by regarding fixed-point binary numbers as truth values, defines a new multivalued logic system in Boolean class such that the set of logic formulas forms a Boolean algebra. This article also shows some typical examples demonstrating that, on the proposed logic system, after learning we can handle inferences readily because of Boolean effect.

Index Terms —Boolean multivalued logic system, fuzzy logic, inference, truth value.

04-ru-Artemieva

Parallel Logical Inference for Confluent Rule-Based System

Irina Artemieva, Mikhail Tyutyunnik
IACP FEBRAS, Russia

Abstract—The article describes the research aimed at developing a program system for multiprocessor computers. The system is based on the confluent declarative production system. The article defines some schemes of parallel logical inference and conditions affecting scheme choice. The conditions include properties of a program information graph, relations between data objects, data structures and input data as well.

Index Terms —Logical inference, parallel rule-based systems.

03-ru-Shalfeeva

Monitoring of conceptual informational resources for intelligent software systems

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Abstract—The quality of an intelligent software system implementation depends on characteristics of knowledge models used and other information resources. The structural method of evaluation of informational resources is proposed in the article. This method allows to monitor all resources used in the development of an intelligent software system and estimate its quality. This evaluation method allows to find out an incompleteness of the domain model, the disagreement between the concept definitions, its weaknesses, imperfections, potential inconveniences.

Index Terms —intelligent software system, information resource, knowledge model, knowledge ontology, graph model, structure evaluation.

03-ru-Timchenko

The concept of information transformation tool based on mapping of graph structures

Margarita A. Knyazeva, Vadim A. Timchenko

Far Eastern National University, Russia

Abstract—The paper develops and illustrates an approach to transformation of information represented as graph structures. It also provides the conceptual information transformation system based on mapping between graph structures. The system comprises three levels which makes it possible to adapt the transformer to information from different domains. The transformer can operate with both structural and textual representations of information. The models describing graph structures and mappings which are specifications for the graph transformation are represented in paper. This approach is implemented in the prototype that performs program translation from one procedural programming language into another.

Index Terms —rule-based transformation of graphs, structure editing, structure mapping, transformation of information.

01-011-ru-Fazliev

Ontology for Water Spectroscopy Information Resources

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V.E. Zuev Institute for Atmospheric Optics, Russia

Manchester University, UK

University College London, UK

Abstract—The ontology of the problems solution properties related to the water spectroscopy is described. These solutions were published in more than 600 articles during the last 50 years and are related to six typical molecular spectroscopy problems. The properties and their values

characterizing solutions validity, root-mean-square deviations were represented as individuals of OWL-ontology. The results of selection rules verification in primary data sources are presented.

Index Terms —Scientific Annotation Model, Water Spectroscopy Ontology

03-jp-Hiroaki

Reduced Operation Size for Chord Method Applying Partially Solving Method

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University of Aizu, Fukushima, Japan

Abstract—We reduce operation steps for the chord method, applying the Partially Solving Method (PSM). The chord method originally has more iterative steps, compared to other numerical methods. Therefore, chord method slowly converges to the approximation. Especially Newton's method requires half the iterative steps to reach to the approximation than the chord method. In this article, we introduce a new numerical method, applying the chord method for PSM.

Index Terms —Chord method, Convergence, Partially Solution Method, Linear equation.

03-025-au-Lewis

Correcting Response Failure Errors in Multi-Objective Optimisation in Unreliable Distributed Computing Environments

Timothy Rawlins and Andrew Lewis
Griffith University, Queensland, Australia

Abstract—Population-based, multi-objective optimisation algorithms are increasingly making use of distributed, parallel computing environments. In these cases it is a commonsense precaution to consider the possibility of a variety of failures. In particular, errors caused by response failures are more prone to arise than in homogeneous parallel computers. While masking errors using redundant computation is simple and reasonably reliable, it is expensive in terms of the computing resources required. An alternative approach is presented that uses a Byzantine agreement methodology, utilising only results already computed. In computational experiments it has a demonstrated ability to correct errors, and salvage useable results from unreliable, distributed computing environments. With increasing reliance on computing resources provided and operated by external agencies, error detection and correction can be expected to become more important to a range of applications.

Index Terms —Fault tolerance, distributed computing, multiobjective optimisation.

16-ru-Shekhunov

Problems of container terminal management systems automation

Shekhunov S.V.

Abstract—The problem of goods turnover containerization is considered. The structure of existing container terminal management systems, their advantages and disadvantages are described. The benefits of these systems deployment are described. The further development of container terminal management systems is suggested.

Index Terms —container terminal management systems, management automation, decision making support systems.

16-ru-Abramov

Decision Support Systems in Transport Logistics

A.L. Abramov, A. A. Kovtaniuk
Far Eastern National University

Abstract—In this paper problems of transport logistics focused on organization of optimal transportation and storage of resources and products are discussed. These problems were reduced to the knapsack and bin packing problems. Different heuristic approaches for the mentioned problems are analyzed. The architecture of the decision support system containing the subsystem for solving optimal cargo loading problems on bases of the algorithms is present.

Index Terms —Decision Support Systems, Multidimensional Knapsack Problem, Three-Dimensional Bin Packing Problem, Heuristic Algorithms.

07-ru-Burago

Automatic Generation of Enumeration Problems

Igor Burago, Igor Shevchenko
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Abstract—The paper considers the automatic generation of the enumeration problems solvable with the constraint propagation technique. An algorithmic procedure is proposed that allows a numerical evaluation of the processing complexity for every particular problem. Properties of a problem being generated may be expressed in terms of these numerical characteristics. The applicability of the approach is illustrated by analysis and generation of whole sets of the cryptoarithmetic problems with given properties.

Index Terms —automatic problem generation, constraint propagation.

12-ru-Danielyan

Dispatching in heat-and-power engineering

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IACP FEBRAS

Abstract—The article raises the question of the relevance of dispatching the operation of thermal units of buildings, discusses the advantages of engaging management in addition to monitoring, points to the advantages of such systems. The Distributed Gather and Control system (DGC) is presented, and its capabilities in handling the data are considered. Also an example of DGC implementation is shown.

Index Terms —distributed systems, process control

11-ru-Nedoluzhko

An approach used to integrate into European Space Agency Service Support Environment using Semantic Web standards

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Abstract—An approach used to integrate a catalogue of satellite data of the Multiple Access Center for Regional Satellite Monitoring of Environment (SSE) FEB RAS into Service Support Environment of European Space Agency is considered. Software, techniques used and their implementation in the Center are discussed. The proposed approach allows to migrate to other interfaces, following SSE development, or to integrate the Center into other systems.

Index Terms —Earth observation, metadata, catalogue, Semantic Web, ontology.

18-12-ru-Kropotov

Management of the channel suppression hindrances in multichannel systems of transfer acoustic signals

Y.A. Kropotov

Abstract—Narrow-band hindrances can be suppressed with a multichannel filtration in systems of acoustic signals transfer. Thus control signals of hindrances suppression in channel are formed. This work is devoted to the formation algorithms of the control signals. The block diagram of the channel with the threshold device is shown. Results of performed researches are presented.

Index Terms —Control signals, the channel of suppression hindrances, systems of transfer acoustic signals, the threshold device

18-ru-Linnik

Acoustic communication system for underwater vehicle telecommunication

Mikhail A. Linnik, Ivan V. Karabanov, Andrey S. Mironov, Igor N. Burdinskiy
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Abstract—The work deals with development and optimization algorithms of acoustic underwater communication system (ACS) to improve key indicators of the system. These algorithms are associated with emission detection and decoding the information signal. In this paper scientifically sound and experimentally investigated principles of multi-channel high-speed information transmission systems for acoustic communication channel. These systems are designed for management and operational control of the underwater vehicle (AUV). The computer model of the ACS which uses the mathematical programming environment Matlab is developed in the paper and simulation results are presented. The paper presents a prototype of the transmitter and receiver ACS, developed by Xilinx FPGA technology. This prototype allows for high-speed telecommunication interaction with the AUVs. The use of FPGA technology improves such important characteristics of autonomous systems as power consumption and reliability. The paper presents also the results of field tests of the developed system in a shallow sea. Practical results of work will be used in research conducted by the Institute for Marine Technology Problems FEB RAS.

Index Terms —Acoustic communication system, correlation function, equalization, FPGA, modulation, pseudo-noise sequence, signal-to-noise ratio.

12-ru-Karabanov

Threshold Methods of Sonar Pseudonoise Phase-shift Signal Detection.

Ivan V. Karabanov, Mikhail A. Linnik and Igor N. Burdinskiy

Pacific National University (PNU), Khabarovsk and Institute for Marine Technology Problems (IMTP) FEBRAS, Russia

Abstract—This work deals with digital signal processing. Different methods of processing of signals in an underwater environment are considered.

The threshold methods of sonar pseudo-noise phase-shift signal detection, which are used in asynchronous systems, when the processing period is undetermined and unknown are analyzed by means of computer modeling for different noise models. The authors propose a new method of symbol processing, which is effective in case of impulse noise. This work was supported in part by the federal target program «Scientific and teaching staff of innovation in Russia 2009-2013» under Grant No. P497 (May 13, 2010).

Index Terms —digital signal processing, computer modeling, correlation, noise models, sonar signals, threshold detection, pseudonoise signals, pseudorandom sequences, underwater systems.

12-51-ru-Devyatisilniy

The Method for Construction of the Two-Dimensional Gravi-Inertial System Based on D'Alembert's Principle

Alexander S. Devyatisilniy, Kirill A. Chislov

Abstract—The mathematical and mechanical foundations of a two-dimensional method of inertial navigation are given. The results of numerical studies of the constructed model of gravi-inertial system constructed are presented.

Index Terms —gravimetry, gyroscope, inertial navigation, newtonometer, wavelet.

12-52-ru-Devyatisilniy

Pseudospectrums and Linear Systems Stability

Alexander S. Devyatisilniy, Dmitry E. Kislov

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Abstract—New results for problem of matrices spectra computation and a methodology for study of observability, controllability and stability of dynamical systems under conditions of finite precision calculations are presented.

Index Terms —pseudospectrum, spectral portrait, stability, observability, controllability

12-ru-Chemeris

The guidance and positioning system based on the video processing

Denis S. Chemeris, Igor N. Burdinsky

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Abstract—The work deals with development of digital guidance system for autonomous underwater vehicle, which ensures the docking to station charging in real time. The main objective of this work

is to compare two approaches to determining the parameters of target (docking platform) and select the optimal. In the execution of the work written by a computer model, and developed an experimental unit based on digital signal processor. The next stage of development will be the full-scale testing and processing of the results.

Index Terms —Autonomous underwater vehicles, log-polar transformation, correlation function, discrete moments, digital signal processor.

12-ru-Lebedev

The Synthesis of Multi-Channel Adaptive Control System for the Autonomous Underwater Robot

Alexander V. Lebedev

Abstract—The new method of the synthesis of multidimensional adaptive control system with reference model self-adjustment for the centralized control of the spatial motion of autonomous underwater vehicles is developed in this paper. The conditions of the self-adjustment process stability with the presence of essential dynamic reciprocal effect between all control channels are obtained and strictly proved. Application of synthesized control laws provides high control quality at any variations of the object parameters within the given ranges. The efficiency of synthesized control system is confirmed by numerical simulation results.

Index Terms —Adaptive Control System, Reference Model, Self-Adjustment, Underwater Vehicle

12-ru-Eremin

Digital algorithms of the cycle operation manipulator control system

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Abstract—the integration of a sampled-analog servo system for a double-link Barrett manipulator to perform cycling actions is examined. Basic methods used to complete the task are hyperstability criteria, analog mode method, stationary complete procedure observer, and low-inertia over-and-internal sample pattern.

Index Terms —multiloop device, discrete algorithms, stationary observer, hyperstability criteria.

03-cn-Ramirez

Analytical Time-Dependent Model for Satellite Thermal Balance

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Chinese Academy of Space Technology, China

Abstract—Earth satellites and spacecraft are continually subjected to extremes of temperature, flow of direct sunlight and temperatures close to absolute zero the interstellar medium. Heat balance models consider the radiative flux in the approach of equilibrium condition little listed in MEO and GEO satellites. We use a non-equilibrium approximation to show that the true thermal evolution. Additionally we discuss the potential application of this model for Venesat-1 satellite.

Index Terms —Thermal balance, non-equilibrium thermodynamics

14-02-ru-Moskalenko

An implementation of the computer knowledge bank of medical diagnostics for ophthalmology

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Abstract—The paper describes a computer knowledge bank on medical diagnostics in the field of ophthalmology. The knowledge bank is developed as a web-based set of applications and can be used within the framework of cloud computing technology.

Index Terms —Medical diagnostics, ontology, knowledge bank, cloud computing.

14-ru-Mikheev

Solution for Gentle Microcirculation Diagnosis for Infants and Non-transportable Patients.

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Far-Eastern department of OAO Megaphon, Russia
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Abstract—The method of screening the vascular network of bulbar conjunctiva in the absence of rigid fixation of the camera and the patient's head, allowing microcirculation diagnosis of infants and nontransportable adult patients (including burn patients). An algorithm for real-time selection of clear frames, a strategy for the detection of vessels in the image.

Index Terms —Bulbar conjunctiva, diagnosis, microcirculation, vasculature.

19-ru-Vorontsova

Mathematical modeling of abundance dynamics for zooplankton community in aquatic ecosystems

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Abstract—The paper deals with the problem of mathematical modeling of changes in the size of zooplankton community. We describe a numerical two-dimensional (time and depth) model of zooplankton abundance. The model takes into account the vertical migration of zooplankton, diffusion and local processes of changes in community abundance.

Index Terms —mathematical modeling in biological communities, zooplankton.

11-19-ru-Aleksanin

Automatic Computation of Tropical Cyclone Tracks on Geostationary Satellite Imagery

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Abstract—A method for automatic monitoring of tropical cyclones (TC) has been developed. The method is based on a structure analysis of TC cloudiness on satellite imagery. It consists of three procedures: detection of cloudy cluster, computation of TC eye size and location, estimation of TC center and geometry of cloudy swirling. The main procedure of TC center estimation uses cloudy structure charts in a form of dominant orientation of thermal contrasts (DOTC). The DOTCs can be used as estimations of wind velocity directions. The procedure computes the TC center on the base of a model of circular movement. The method approbation on satellite images of Far-Eastern region for three year summer seasons has demonstrated high reliability (the centers have been computed almost always) and good correspondence with the results of Japan Meteorological Agency and Joint Typhoon Warning Center (USA). The TC tracks are used for automatic computation of typhoon warm core, humidity parameters and near surface wind velocity on the base of atmosphere profiles of temperature and humidity retrieved from ATOVS/NOAA radiometer measurements.

Index Terms —automatic monitoring, tropical cyclone, satellite images, warm core.

19-ru-Zagumyonov

Automatic ocean eddy detection on satellite imagery on the base of dominant orientations of thermal contrasts

A.I. Alexanin, A.A. Zagumyonov
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Abstract—The sea surface merged charts of thermal structures in the form of dominant orientations of thermal contrasts (DOTCs) provide an information about surface circulation regularly. High correlation between DOTCs and flow directions makes it possible to use them for water eddy identification. A new method for automatic identification of eddies as arbitrary closed circulations is proposed. The method consists of three procedures: identification of an eddy and its center, computation of size and shape; construction of an eddy contour by minimization of DOTC "leaking" out of the contour; the analysis of constructed contours and screening off false detected objects. The main problem of the automatic eddy detection which is the possibility for generation of the false detected objects is considered. The screening algorithms are proposed, their effectiveness is demonstrated and the opportunities of automatic eddy tracing on a temporary chart sequence are estimated. The method has been tested on three month sequence of DOTC charts of Okhotsk sea region under heavy cloudy conditions.

Index Terms —automatic detection of the sea eddies, satellite images, thermal contrast orientations.

05-ru-Borodulin

Capture Techniques Capable of High Dynamic Range Image

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Abstract—Most of real scenes have a much greater dynamic range than ordinary digital cameras can capture. In simple words, wider dynamic range allows high dynamic images to more accurately represent the wide range of intensity levels found in real scenes, ranging from direct sunlight to faint starlight. This paper addresses the problem; we describe a few techniques of capturing high dynamic range images using current technologies.

Generally, we focus around digital images and video. High dynamic range technology is of great

practical use. For example high dynamic range in video will be demanded by professional cameramen, security systems, space engineering, etc.

Index Terms —High Dynamic Range Image, HDRI.

05-ru-Pereguda

Fractal processing of multimedia data

E. S. Pereguda

Abstract—In this paper, the problems of inverse fractal transformation of multimedia data are considered. Fractal processing of multimedia data consists in calculation of coefficients of fractal transformation for video, still image or audio source. Inverse fractal transformation is a nonlinear approximation of signal. Fractal processing can be used for many purposes - compression, synthesis, recognition, etc. But the inverse fractal transformation has one disadvantage – it is very computing intensive operation.

Index Terms —Audio, artificial neuron, fractal, inverse fractal transformation, still image, series pictures.

15-05-ru-Bahrushin

High Embedding Capacity and Low Distortion Watermarking Scheme

A.P. Bahrushin, G.I. Bahrushina, R. I. Tsoy

Abstract—High embedding capacity and low distortion in image quality are two important properties of digital watermarking. In this paper, we describe a novel watermarking scheme and compare its performance with different schemes based on difference expansion transform. To satisfy the requirements of large capacity and high image quality, we propose to embed each bit of information into an image magnitude spectrum by using short bipolar subsequences. The experimental results for test images clearly show that our scheme provides much more embedding capacity and significant improvement in the quality of the watermarked image when compared to difference expansion.

Index Terms —Image watermarking, bipolar subsequences, difference expansion transform, magnitude spectrum

17-ru-May

The system for volume visualization of computed tomography objects

V.P. May, S.V. Melman

Abstract—The system for volume visualization of tomography data is presented. It allows rendering views of bones for solving problems of facial surgery.

Index Terms —Computer tomography, volume rendering, methods of scanning, algorithm of visualization and data processing.

17-ru-Kudryashov

Reconstruction of three-dimensional models of buildings based on a set of photographs

A.P. Kudryashov

Abstract—In this report we present a system for reconstruction of urban environments, which enables reconstruction of a three-dimensional scene from a set of uncalibrated photographs.

Index Terms —computer vision, computer graphics, reconstruction, 3d model, urban environment, calibration, matching of feature points.

03-51-ru-Gribova

The concept of an intelligent tool for development of diagnostic computer simulators

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Abstract—The article presents a general concept of a knowledge-based tool for the development of diagnostic computer simulators (DCS). Principal statements of this concept are formulated; a model of DCS and its main components are defined. A conceptual architecture of a tool for design, implementation, and modification of DCS is described.

Index Terms —computer simulator, intelligent tool ontology.

12-ru-Filaretov

MATLAB using in software for visual simulation of multilink manipulators dynamics

V.F. Filaretov, D.A. Yukhimets, E.Sh. Mursalimov

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Abstract—This work is dedicated to development of integration method of Matlab and external program for visualization of multilink manipulator movement in order to create the simulating complex for investigation of their control systems. It is offered to use the UDP protocol for data transmitting between Matlab and external program. But in this case we must solve the synchronization task for calculation processes of Matlab and external program. In this paper the algorithm of automatic synchronization of above-noted processes is offered. This algorithm is based on using of methods of automatic control theory. Carried out calculation experiments completely confirm the workability and efficiency of offered approach.

Index Terms —Simulation, synchronization, Matlab, multilink manipulators, visualization, control systems.

03-ru-Kulchin

Complexes of neural networks for information processing in distributed fiber-optical measuring systems

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Far East Branch of Russian Academies of Sciences, Russia

Abstract—The paper discusses tomography reconstruction of distributed physical fields by means of fiber optical measuring networks for parallel setup of measuring lines with a small number of scanning directions. The approach whose novelty involves measuring network geometry optimization for further application of neural and/or algebraic technologies to restore of the functions studied is presented. The advantages of neural networks complexes for direct restoration the physical fields' functions and for synthesis of projective data in Radon space are studied.

Index Terms —artificial neural networks, distributed physical field, fiber optical information measuring system, parallel beam tomography.

15-ru-Voloshin

Automation system of monitoring and dispatching of the server room

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IACP FEB RAS

Abstract—Developed product is a hardware-software system for comprehensive monitoring and dispatching of all equipment in the server room. These observations are recorded in a database for later analysis. The system consists of several subsystems and is designed to monitor the equipment from any distance. Also, this system allows to monitor and warn of emergency situations in real time.

Index Terms —information analysis, monitoring.

12-10-ru-Kuznetsov

Diagnostic application in the heat-power engineering

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IACP FEB RAS

Abstract—The developed software is presented for analytical data processing. The data about objects of heat-power engineering are accumulated in a database. As an example, implementation of diagnostic methods is demonstrated by a software module "Express-analysis". The module is used to perform the measurement inaccuracy control, detection of abnormal and emergency situations, as well as the defect identification of metering equipment.

Index Terms —energy management systems, information analysis, monitoring, technical diagnostics.

04-ru-Tarasov

Integration of computing cluster monitoring system

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Parallel computing group CC FEB RAS 65, Russia

Abstract—High performance computing (HPC) technologies are widely used last decade. Most popular solutions nowadays are computing cluster based. Such systems dramatically depend on reliable work of each component, thus theirs monitoring and servicing are very important tasks. There was developed variety of monitoring systems, however most of them lacks functionality and are not easily extensible, although highly scalable. They are not able to interact with each other. In previous author works, new monitoring system design was suggested. This article describes how

integration capabilities of three-layered monitoring system design may be used to add features to other monitoring system and help to interact with the third party software.

01-16-ru-Apanovich

Ontology based portals and visual analysis of scientific communities

Zinaida V. Apanovich, Pavel S. Vinokurov

Abstract—The process of development of an ontology-based knowledge portal and creation of its content is time-consuming and labor-intensive. The lifetime of such portals is sufficiently long and they collect great volume of valuable information. This information can be analyzed from various points of view. This

paper describes an extension of the visualization subsystem, developed at the A.P. Ershov Institute for Informatics Systems, with new tools for visual analysis. An example of extracting information about scientific cooperation from the content of a knowledge portal and two ways of its visualization are demonstrated.

Index Terms —hierarchical edge bundles, knowledge portal, modularity, ontology.

01-ru-Kononenko

Language Resources in Ontology-Driven Information Systems

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Abstract—The role of the ontology is discussed in the context of the development of information system which uses natural language processing services for automatic populating and updating the system's content. The problem of creation of language resources for text processing is particularly addressed and exemplified by the development of information thesaurus on catalysis. A number of techniques for recognizing lexical structures and lexical-semantic relations in a domain-specific text corpus are presented, concentrating on techniques that can serve as a basis for an automatized construction of the thesaurus vocabulary and relations.

Index Terms —domain ontology, language resource, lexical pattern, natural language service, terminology, thesaurus.

01-ru-Kudinova

Using of ontological descriptions for the synthesis of simulation models.

O. Kudinova

Abstract—Paper tells about the synthesis of the technology of simulation models based on technology conceptual patterns. Since the typical patterns and ontologies can contain synonymous or incomplete information, we will describe in detail the procedure for finding synonyms and back “extraparameterization” of the ontology with the further application of the procedure of synthesis simulations.

Index Terms — “extraparameterization” of the ontology, synthesis of simulation models, technology of conceptual templates, the search procedure of the synonyms.

01-ru-Privesetsev

Ontology for Water Spectroscopy Information Resources

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Manchester University, UK
University College London, UK

Abstract—The ontology of the problems solution properties related to the water spectroscopy is described. These solutions were published in more than 600 articles during the last 50 years and are related to six typical molecular spectroscopy problems. The properties and their values characterizing solutions validity, root-mean-square deviations were represented as individuals of OWL-ontology. The results of selection rules verification in primary data sources are presented.

Index Terms —Scientific Annotation Model, Water Spectroscopy Ontology

01-ru-Reshtanenko

A Modular Ontology of Organic Chemistry

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Abstract—The article describes the structure of a modular ontology and its model for organic chemistry. Examples are given which represent terms used to define the response mechanisms. The ontology model may be used to develop intellectual systems for this domain and domains close to organic chemistry. It also may be used to develop information systems of other classes.

Index Terms —Organic chemistry ontology, ontology model, intellectual system for organic chemistry.

02-35-au-Lynar

Conserving Energy in Cluster Computing Through Resource Allocation

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Abstract—Energy consumption is an important consideration in computing. Distributed computing environments and data centres consume substantial amounts of energy, and the cost of energy is increasing. We explore the possibility of reducing the energy consumption of a distributed computing resource through appropriate resource allocation strategies. We examine a number of possible workload scenarios and analyse the impact of different resource allocation mechanisms on power consumption and time taken to execute tasks. Our results show that the choice of resource allocation mechanism can substantially alter power usage, time, and the total energy consumption of a distributed computing resource.

Index Terms —Distributed computing, Resource allocation, Auction, Distributed computing, Energy conservation, Green IT

02-ru-Kleshev

Interactive theorem proving and cloud computing

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Abstract—In this report various schemes for checking correctness of mathematical proofs are considered. A project of interactive theorem proving based on cloud computing is presented. The main features of this project are extendable language for representing mathematical propositions, extendable calculus of a higher order, two models for intuitive proofs, and also theorems and their proofs represented by mathematical dialect as an input for the system, and automatic transformation of the input into the operational model of intuitive proof.

Index Terms —Interactive theorem proving based on cloud computing, extendable language for representing mathematical propositions, extendable calculus of a higher order, models for intuitive proofs.

03-018-cn-Liu

Study of High Precision Missile Loading Method

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Abstract—In this paper a method that measures relatively position relationship quickly and accurately between two vehicles both on a horizontal plane is introduced. When the linear CCD camera placed on the end of manipulator scans two point targets located on the other vehicle, by virtue of the spatial intersection principle and trigonometry theorem, the relative position relationship between the loading vehicles and launching ones can be gotten (i.e. the spatial coordinate parameters of x , y , z and the angle displacement α). At the same time the paper establishes that the measurement error of length is less than $\pm 1\text{mm}$, by analysis of the error analysis and the simulation of computer. The angle displacement α is less than $\pm 3'$, which satisfies the technical requests. So the vehicle orientation and loading missiles can be both done at the shortest time. It meets the demand of centralization between the measurement and execution. For both automatic transshipment and spatial position relationship measurement, the study is valuable. And the manipulator is measure device as well as executive one so that residual inherent error decreases according to identical reference principle. Therefore the measure precision can be improved greatly.

Index Terms —CCD, Non-contact, Simulation, Measurement

03-cn-bi

Controller Design with State-space Method in Image Rotation to Eliminate System

Bi Yong-li

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Abstract— In some image processing systems, the rotation of the carrier leads to image rotation. As a result, this causes to observe inconvenience for the observer. Therefore, if the CCD board can rotate the opposite direction with the carrier, this can eliminate image rotation, and be easy to observe for the observer. But, there are very strong disturbance moments in the image rotation to eliminate system. A controller designed according to classical control method does not ensure the controlling precision demand in such a system. In the paper, design a controller according to state-space method. Moreover, the controller's controllability and observability were discussed. The result of simulation shows that it is very effective to restrain disturbance moments. This work

provides a new thought for a controller design to restrain all kinds of disturbances.

Index Terms — State-space, Rotation-removing, Controllability, Observability, Controller.

03-cn-Liang

Principle and Realize of Electronic Commerce Middle-Ware

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Abstract—Abstract- Based on the basic architecture of electronic commerce (EC), the application server and communication platform and security platform of electronic commerce middle-ware is analyzed. A realization flow chart of electronic commerce middle-ware is put forward based on J2EE architecture.

Index Terms —middle -ware; electronic commerce; J2EE; architecture; realization flow chart.

03-cn-shi

How to Utilize High-tech Teaching Method to Improve English Teaching Skill.

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Abstract—More and more learners prefer to choose non-class format to study English due to developed information technology and it's derivatives. That is a big challenge to traditional English teaching procedure. Nowadays, most professional teaching staff's research focus on the combination of information technology and modern education skills, because almost all universities and education institutions have equipped modern multi-media language lab and opened online communication platform to improve traditional teaching method. The author of the paper want to discuss and analyse the questions about how to use these high-tech skill to organize learners to study effectively and efficiently.

03-cn-yan1

Information Fusion Kalman Estimators with Different Local Model

Guangming Yan, Xiaojun Sun, Shi Guangfan

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Abstract—For the multisensor linear discrete time-varying stochastic control systems with different local models, three distributed optimal fusion Kalman estimators weighted by matrices, diagonal matrices and scalars are presented in the linear minimum variance sense. They can handle the fused filtering, prediction and smoothing problems, and are applicable to the multisensor systems with colored measurement noise. They are locally optimal and are globally suboptimal. The accuracy of the fusers is higher than that of each local Kalman estimator. In order to compute the optimal weights, the new formula computing the cross-covariances among local smoothing errors is given. A Monte Carlo simulation example for the tracking system with colored measurement noises and 3 sensors shows their effectiveness.

Index Terms —Different local models, Kalman filter, Multisensor information fusion, Weighted fusion.

03-cn-yan2

Research on Fundamental Data Management System of Efficacy Evaluation for TCM Advantage Diseases

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Changzhou College of Information Technology, China

Abstract— The efficacy evaluation of TCM advantage diseases is the important task of the continuation and development of TCM. How to effectively carry out fundamental data collection and storage has become the key to research work of efficacy evaluation. This paper introduced design preparatory works of fundamental data management system of efficacy evaluation for TCM advantage diseases, described the system design goals, design ideas and key design elements.

Index Terms — TCM, Advantage Diseases, Efficacy Evaluation, Fundamental Data, Management System

03-cn-zhang

Research on Digital Processing of Traditional Chinese Medicine Treatment Information

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Heilongjiang University, China

Abstract— By the collection of the authoritative literatures and the reasonable design, it is extremely necessary to bring out digital processing of Traditional Chinese Medicine treatment information. This paper introduces the digital processing task of Traditional Chinese Medicine information, and presents basic classification of Traditional Chinese Medicine information database. Finally, based on the information of nephropathy treatment by Traditional Chinese Medicine, this paper implements the nephropathy treatment information database.

Index Terms —Traditional Chinese Medicine, Treatment Information, Digital Processing, Database.

03-in-Arasu

Analysis and Design of Multi-Agent System for Processing Bio-Signals Using Agent Oriented Programming Approach with JADE

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Abstract—Agent can be defined as a component that, given a goal could act in the place of a user within its domain knowledge. Agents are also called intelligent agents, as intelligence is a key component of agency. Agent oriented approach can be viewed as next step of Object Oriented approach. The paper attempts to demonstrate the analysis part of developing Multi-Agent platform for processing of Bio-signals using JADE – Java Agent DEvelopment framework. FIPA specifies a set of standard interaction protocols, which can be used as standard templates to build agent conversations. For every conversation among agents, JADE distinguishes the Initiator role - the agent starting the conversation and the Responder role - the agent engaging in a conversation after being contacted by some other agent. JADE provides ready-made behaviour classes for both roles

in conversations following most FIPA interaction protocols. The technical goal is to develop a multi agent platform for processing of bio-signals aiming at assisting medical practitioners in developing standard examination procedures. The JADE platform is a popular, FIPACompliant platform for the development of multi-agent systems. As the agents on the JADE environment run on Threads, the response time is very less which helps the medical practitioner to make a quick diagnosis.

Index Terms — Agents, JADE, FIPA, Bio-Signals

03-ir-Moussavi

Learning Improvement by Using Matlab Simulator in Advanced Electrical Machine Laboratory

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Sharif University of Technology, Tehran Iran

Abstract—This paper presents how can teach complicated problems in electrical engineering subjects (electrical machines) by using simulators such as MATLAB/SIMULINK. Simulation of direct vector control of induction machine (IM) drive on the rotor flux direction with composite model flux observer can improve electrical machine teaching-learning procedure for graduated and under graduated levels. In the indirect vector control of IM, current reference values are used for estimation angle of the rotor flux space vector (ARFSV), however using current reference values instead of current real values can decrease accuracy of ARFSV. In the direct vector control, current real values (current feedback) estimate the ARFSV. The ARFSV estimation can be performed by current model flux observer and voltage model flux observer. These observers have their own limitations. The composite model improves into some extent disadvantages of every individual ones. Simulation of composite model is applied to induction machines and obtained results compare to the classical current and voltage models. The composite model approach shows remarkable advantages over those classic ones, i.e. speed control over wide range of motor operation and enough short settling time. All these remarkable advantages support application of composite model in ARFSV.

Index Terms —Learning Induction Machine (IM) Drive, Education of Composite Model Flux Observer, Estimation angle of the rotor flux space vector.

03-ru-Rybina

Some aspects of evolution of tools for support dynamic integrated expert systems development

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Abstract—State and tendencies of evolution of modern development tools for static and dynamic expert systems development are being analyzed. New facilities of unique Russian instruments for support of integrated expert systems development – complex AT-TECHNOLOGY – connected with dynamic integrated expert systems development are in question.

Index Terms —Complex AT-TECHNOLOGY, dynamic intelligent system, development tools, integrated expert system, real time, simulation modeling, temporal reasoning.

03-tw-Fahn

A Pick-up Balls Robot with Visual Searching and Path Planning in Known Environments

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National Taiwan University of Science and Technology

Abstract—This paper presents a pick-up balls robot on which one webcam and five ultrasonic sensors are equipped. The robot can efficiently search and pick up the balls on the ground via visual servo control. It also owns the capability of path planning, and accomplishes balls collection jobs in known environments effectively. The experimental results reveal that the robot not only quickly picks up the table-tennis balls on the floor, but also safely avoids colliding with table-tennis tables and walls through a novel cell decomposition scheme and an improved path planning algorithm. With the aid of a special collecting mechanism assembled on the robot, the athletes will not pick up the balls hardly after daily training. Therefore, they can train easily and absorbedly.

Index Terms —Target detection, cell decomposition, path planning, pick-up balls robot, visual servo control, template matching.

04-jp-Kamiura

Energy Reduction Using Two Static Voltage Scheduling Approaches for Real-Time Multi-processor Systems

Naotake Kamiura, Tejiro Isokawa, Ayumu Saitoh, and Nobuyuki Matsui

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Abstract—A voltage-scheduling heuristic is presented for a real-time multi-processor system to reduce its energy expenditure. It consists of offline and online components. Provided that processors can do useful computation with two voltage levels, in the offline component, two static voltage-scheduling algorithms independently assign a task two time instants when the task absolutely completes its execution. In the online component, one of the time instants is chosen according to the averaged ratio of actual execution units compared to worst-case scenarios of the completed tasks, and the portion to be run at a lower voltage is extended for a task succeeding to them. Simulations are made to show the effectiveness of the proposed heuristic.

Index Terms —Energy consumption, Real-time system, Task precedence graph, Voltage scheduling.

04-ru-Bury

Parallel simulation of dynamic systems on large time intervals with GPU.

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Abstract—We describe here the parallel implementation and numerical experience with Parker-Sochacki method for the numerical solution of the N-body problem. The algorithm was implemented for the family of NVIDIA graphical processors (GPU) using CUDA programming technology.

Index Terms —CUDA,GPU,N-body problem, NVIDIA

04-ru-Novikov

Parallel Algorithm for Explicit Runge-Kutta Method 2nd Order on Accuracy and Stability Control

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Siberian State Technological University, Krasnoyarsk Russia

Abstract—A substantial increase in efficiency may be obtained by explicit Runge-Kutta methods in which a control of accuracy and stability is made dynamically as the solution develops. In this paper we give in detail a serial and parallel algorithms with monitoring of local truncation error to ensure accuracy and adjust step size.

Index Terms —accuracy and stability control, explicit method, local error, parallel algorithm.

06-ru-Nikiforov

Timely Message Delivering in Local Networks

V. Nikiforov and V. Shkirtil

Abstract—An approach for evaluation of upper bound for message delivery time in distributed real-time systems with CAN interface is presented. It is shown that verification of timely message delivery may be provided with methods, similar to verification of task feasibility in hard real-time systems. The approach permits to build distributed real-time software applications with predictable behavior under any permitted scenario of system events; perform of timely calculations in network nodes and timely data delivery between networks nodes, linked by CAN interface, achieve efficient use of hardware.

Index Terms —CAN interface, distributed software applications, real-time systems, task feasibility.

07-ru-Konstantinov

Improvement in computation speed by combined use of graphical programming packages

N. K. Konstantinov, A. P. Lyah

Abstract—We would like to demonstrate the advantage of connecting using modern means of visual programming. The dependencies between time of data treatment and number of processing points when LabVIEW and MATLAB are used both together and then separately. We also give an example of virtual gadget for system identification through auxiliary operator, which was made on LabVIEW's base with using methods of mathematical processing from MATLAB.

07-ru-Shakhgelyan

The Principles of Effective Automation of University

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Abstract—The basic principles of effective automation of university are discussed in the article. The ontological model is developed using the principles. The model provides development and maintenance of university enterprise information system.

Index Terms —effective automation, enterprise information system.

07-ru-Zhuravleva

Introduction of an automatic merit rating of control algorithms using virtual laboratory benches

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Abstract—The article discusses the main advantages of using virtual educational boards (VEB) in studying of programming languages. The method of automatic merit rating of control algorithm is presented. The method is tested on VEB of automatic boxes sorting.

Index Terms —virtual educational boards, LabVIEW, program implementation

11-ru-Alexanin

Research Arrangement for Ecological Control of Peter the Great Bay

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Abstract—Complexity of a task of sea ecological assessment, and first of all identification and monitoring of harmful algal bloom, compels to integrate facilities and activities of three research institutes of Far-Eastern Branch of Russian Academy of Sciences (Institute for Automation and Control Processes, Institute for Marine Biology, Pacific Oceanological Institute). Equipment of three centers (Satellite Center, Center of Lidar Methods for Substance Research, Center for Harmful Algal Bloom and Bio-toxicity Monitoring) was used for this purpose. Originated capabilities allowed to organize comprehensive field and laboratory investigations for solution of this task. Description of methods used and preliminary results are presented.

Index Terms —atmosphere sensing with lidars, harmful algal bloom, fluorimeter measurements, phytoplankton species composition, satellite monitoring.

11-ru-Katamanov

Automatic Navigation of One Pixel Accuracy for Meteorological Satellite Imagery

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FEB of RAS, Russia

Abstract—Multitemporal and multisatellite studies or comparisons between satellite data and local ground measurements require nowadays automatic navigation of one pixel accuracy for meteorological satellite images. The problems of precise automatic navigation of satellite imagery are considered and an approach based on automatic calculation of ground control points (GCPs) and

navigation attitude forecasting is developed. An automatic navigation method of one pixel accuracy is presented. It is suitable for "full" images received during one session from meteorological satellites. The GCP automatic calculation procedure is based on verification of sea-land separability hypothesis. The verification criteria used can increase significantly the reliability of GCP calculation under heavy weather conditions of the Earth observation. The method is based on a correction procedure of satellite attitude angles (roll, pitch, and yaw). A possibility to forecast the navigation attitude parameters in the form of common translation of them earlier navigated images is considered and the results are discussed. The results of approbation of new navigation method for a yearly image set of satellites images (series POES NOAA, MTSAT-1R and FengYun-2C) received in the Multiple Access Centre for Regional Satellite Monitoring of Environment (Far-Eastern Branch of Russian Academy of Sciences) are presented.

Index Terms —ground control points, navigation attitude forecasting, satellite image navigation, satellite attitude (roll, pitch and yaw), navigation of one pixel accuracy.

11-ru-Krasnopeev

Open standards as a basis for integration of geospatial data into information infrastructure

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Abstract—Interoperable geospatial technologies can play a foundational role in handling the needs of removing all barriers to access geospatial data and geoprocessing environments, i.e. to intensify the circulation and usage of geospatial data; to achieve radical changes in decision support technologies. The Open GIS Consortium is developing standards that enable open, vendor and format neutral geoinformation discovery, access and sharing.

We demonstrate the first implementation results of the Pacific Institute for Geography FEB RAS application framework, that enables users to access and process geospatial data from a variety of sources across generic computing interfaces within an open information technology. WMS, WFS and CSW have been established for geospatial data. The OpenGIS Web Processing Service (WPS) was also deployed, which may offer both simple and complicated calculations. Geospatial portal solution was implemented to support reusable standards-based deployments. Client application (<http://gis.dvo.ru:9080/webgis>) provides, at present, an environment for visualizing and analyzing geospatial data from variety of sources/services.

As a part of a corporate GIS development we plan to implement several applied solutions:

- Prototype of Primorskiy Kray hydrological cadastre
- Net of experimental hydrological basins of Russian Federation

Implementation of open geospatial standards is a way to lower the costs of data acquisition and enrich and extend the basis for performing geographic analysis. Users, technology providers, and society value the benefits of open standards. The enterprise "return on investment" in open interfaces is unquestionable today.

Index Terms —Geospatial Interoperability, Open Geospatial Standards, OpenGIS Web Services, Spatial Data Infrastructure.

11-ru-Sorokin

“SIGNAL-S” – Automated information system for seismological data processing

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Abstract—Aspects of the design and operation of an automated information system “Signal-S” are considered in the paper. The system is designed for making access to the instrumental seismological data, including the collection, storage, organization and primary processing of waveform archive

Index Terms —Seismology, observing network, information system, archive, data processing

12-04-ru-Dorozhko

Modeling of the Vessel Emergency Maneuvering

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Abstract—Identification signs of the initial stage of emergency maneuver of an ocean vessel are obtained by using a dynamic equation of the vessel. These signs are the maxima of a vessel linear acceleration and they can be used both by vessel traffic systems and navigators to prevent marine catastrophes caused by late detection of dangerous maneuvers of vessels.

Index Terms —ocean vessel, emergency maneuvering, acceleration, propeller thrust and torque.

12-ru-Kulchin

Method for Finding Coefficients of Approximating Polynomials

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Abstract—In this paper we analyzed the properties of the approximating polynomials, obtained by the method of least squares. It was revealed that with increasing density and uniformity of the distribution of examples on the interval of approximation, the criterion of minimum mean-square error indirectly brings to equality of the integral characteristics of the approximating polynomial and the approximated function. The method has been suggested to parameterize of the approximating polynomials on the basis of this, and the numerical experiments demonstrated advantages.

Index Terms —approximate approach, approximating polynomials parameterization method, least-squares method.

12-ru-Petrovsky

Conceptual Model of Decision Support for Emergency Assistance in Road Accident

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National Academy of Sciences of Belarus, Belarus

Abstract—The paper considers a conceptual model of decision support in the smart environment.

The model allows us to organize the information support to the emergency decision maker in the current situation through the use of domain knowledge and information from autonomous resources. Application of the suggested approach provide for diminishing the volume of incoming information and reducing the time taken to decision-making.

Index Terms —conceptual model, decision support, emergency assistance, traffic accident.

12-ru-Zyubin

Software for Physical Simulation of Large Size Silicon Single Crystal Growth

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Abstract—The paper presents a system architecture for the physical simulation of large size ingots growing by the Czochralski process. The system requirements, main software and hardware solutions are discussed. The paper describes detected problems and proposed steps to meet the requirements.

Index Terms —control system, Czochralski process, LabVIEW, physical simulation.

13-ru-Zagorulko

On Experience of Building Knowledge Portals on Humanities

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Abstract—The paper discusses experience of building knowledge portals providing the systematization and integration of knowledge and information resources on humanities, as well as the content-based access to them. To provide a sufficiently complete and consistent representation of the knowledge and information resources, their systematization and integration are performed on the basis of ontology. The suggested approach to building knowledge portals based on ontology was successfully used in the projects aimed at development of the scientific knowledge Internet portals on archeology and computational linguistics.

Index Terms —knowledge portal, ontology, information resources on humanities, content-based access.

14-ru-Bogdanov

Information-analytical systems for monitoring, control and analyzing of power engineering

Bogdanov Yu. Yu., Chipulis V.P.

Abstract—The problems of construction and development prospects of information-analytical systems in thermal power systems are considered. Showing examples of implementation and describes the capabilities of presently operating systems. Emphasis is placed on analytical processing of measuring information accrued during functioning of systems.

Index Terms —energy management systems, information analysis, monitoring, control systems

14-ru-Demenev

MATHEMATICAL MORPHOLOGY METHOD FOR NANOTHERMOLYSIS RESEARCHES

Vladimir A. Demenev, Nicolay E. Kosykh, Sergey Z. Savin

Abstract—This work is devoted of mathematical methods for morphological and histological pathological process studies for nanothermolysis processing, keeping, issues and analysis given medical computer tomograms on base of virtual information models of cells. The scientific significance of cell information system (CIS) is connected with the development of a universal approach to creating a unified virtual informational system for prospective research of nanotechnology, nanodiagnostic, hystology, radiology medicine and biology, physiological mechanisms of activity, development and stability of a human or an animal cells, ecological physiology of humans and animals, development biology, and also in the theoretical field of neurocomputer development, neurophysiology and neurobionics.

Index Terms —Biological Information System (BIS), Mathematical Morphology (MM), Controlled Nanothermolysis (CNTL), Virtual Information Modeling (VIM).

14-ru-Kosykh

DESIGNING THE SYSTEMS OF COMPUTER DIAGNOSTICS OF MEDICAL IMAGES

Nicolay E. Kosykh, Valery V. Gostuyshkin, Sergey Z. Savin, Igor V. Vorozhtov

Abstract— Consider questions of use in oncology practice of original methods of automatic analysis for the evaluation of results of radionuclear studies. Appointment of the complex of programs consists in getting the mathematical features of tumor process in bones, reveal on planar (two-measured) osteoscintigrammes beside sick with oncology by pathology for perfecting the diagnostic possibilities of method scintigraphy at the study of metastasis striking a skeleton in conditions of singlepurpose clinical centre an oncological help to the population. Determined numeric features of texture parameters, show markers of metastasis nature of hearths an hyperfixation of RFP on the planar scintigrammes. With provision for spatial regularities of construction of skeleton is developed expert recognition system of metastasis nature of hearths an hyperfixation of RFP as of planar scintigraphy. Results of studies are to be used in other areas of beam diagnostics for early revealing the pathological processes and warning is social significant diseases.

Index Terms — nuclear medicine, osteoscintigrammes (OST), radiopharmpreparates (RFP), pattern recognition, metastasis zone (MS).

14-ru-Nechyporenko

Medical Information Systems: Status and Problems

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Abstract—The development experience of several modern MIS is considered, areas of the application are defined, standards and subsystems (functions) top level overview is provided. The MIS considered have, depending on their purpose, a different set of functions, correspondence to HL7, DICOM and other standards.

14-ru-Petryaeva

Ontological Approach to Formalizing Knowledge about Perforated Stomach Ulcer

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Abstract—The article defines knowledge about perforated stomach ulcer that is formalized on the basis of a medical ontology model. The article describes a base of observations for the disease and also a knowledge base which determines a clinical presentation of the disease. The dependences on courses of the disease and process localization are taken into account during knowledge formalizing.

Index Terms —medical ontology model, formalization of medical knowledge, base of observations, medical knowledge base, perforated stomach ulcer

14-ru-Stepanova

Custom user interface support in a medical invoice processing system

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Lavrentyev Institute for Fluid Dynamics, Russia

Abstract—We introduce an approach for generating special user interfaces for business application software which uses XML to describe them. This essentially simplifies custom user interface support and settings.

Index Terms —Customization, user interface, Web, XML.

17-ru-Mirzaev

About one model of image recognition

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Abstract—Problems of pattern recognition, where patterns are described in the high dimensional feature space are considered in this work. Modified model of recognition algorithm based on estimates' calculation is proposed. Main idea of the proposed model is to build recognition algorithm in the space of uncorrelated features. Main stages of the modified model of recognition algorithm are presented. Applicability of proposed model to the problem of person recognition by facial images is proved.

Index Terms —estimates' calculation algorithm, base features' subsets, recognition algorithms, recognition problems, uncorrelated features, strongly correlated features, representative features, image, person recognition.

18-ru-Konstantinov

The use of National Instruments software-hardware tools for generation of signals of special form

N. K. Konstantinov, V.N. Ovcharuk

Abstract—In this report gives descriptions of principle hardware-software complex. It was designed for generation signals special form on their frequency characteristics. This complex intend for taking NDT acoustic methods, where there is often a need generate probe of complex forms. The development medium- Lab View 7.1, for the practical realization of the signals used by the hardware company National Instruments.

Index Terms —Amplitude, DAQ-card, Fourier series, spectral analysis, signal generator, spectral characteristics, , spectrum.

18-ru-Lyah

Identification of the signals by their secondary parameters of spectral characteristics with National Instruments software and hardware

A.P. Lyah, V.N. Ovcharuk

Abstract—The paper describes the structure hardware and software analytical complex “Analysis of secondary parameters of the spectral characteristics”, providing the study of signals with the possibility of compiling a database for later identification signal. Reviewed the scientific and practical significance of the developed software.

19-51-ru-Zhdanova

The significance of metabolic regulation in phytoplankton dynamics

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Abstract—The model considering influence of non-linear effects of metabolic regulation of phytoplankton’s growth has been developed and investigated in this work. It has been shown by the model that metabolites that are produced by the algae are capable to stabilize the phytoplankton’s growth under conditions of abundant inflow of nutrients.

Index Terms —Dynamics, phase portrait, metabolite, phytoplankton, stability, stationary solution.

19-52-ru-Zhdanova

Dynamics of population size and genetic structure in two-aged population with pleiotropic locus

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Abstract—The modes of dynamics of genetic structure and population size are investigated in this work. It is assumed that main population characteristics, such as reproductive potential and survival rate of reproductive part of population in following years of life are determined on genetic level. Our research has shown that despite increasing of average population fitness is followed by arising of complicated dynamics of population size and of genetic structure, further growth of fitness is

capable to stabilize the genetic structure of population and so only the population size will be fluctuating with regular or chaotic circling. The type of the final genetic equilibrium depends upon initial conditions in a very complicated way. Therefore the initial conditions play essential role for the evolution of natural population.

Index Terms —age structure, attractor, equilibrium, evolution , population size, stability.

19-53-ru-Zhdanova

Optimal harvest with constant quota in population with two age-classes

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Abstract—This work considers the results of optimal harvest with constant quota in population with two age-classes. It has been analytically shown that maximum of income is not achieved under the catch from both age-classes simultaneously. It has been shown that even if catch with constant quota is carried out from one age group independently of individual genotypes the type of genetic equilibrium in population can change.

Index Terms —age structure, equilibrium, evolution, monomorphism, optimal harvest, polymorphism, stability.

19-ru-Ashikhmina

Spatial-temporal distribution of photosynthetic primary production in a northwest part of Sea of Japan obtained from satellite data

Ashikhmina E.V., Simonov A.S.

Abstract—The purpose of the this work is to estimate the photosynthetic primary production (PP) of the north-western part of Sea of Japan. The PP was determined on basis of single equation relating chlorophyll concentration in the near surface layer and PP in the productive layer. Monthly average estimates of chlorophyll concentrations are based on long-term series of satellite data.

Index Terms —Monitoring of the ecosystems, concentration of chlorophyll “a”, primary production (PP), satellite data.