

International Workshop and School of Young Scientists:

Theory, experiments and numerical simulations of reaction-diffusion systems in applications for biotechnology, biomedicine and energy production

12 – 16 of October 2020

Vladivostok State University of Economics and Service,
Vladivostok, Russia



Major topics

- Modelling and computational issues of combustion phenomenon
- Dynamic behavior, pattern formation in biological systems in the flows
- Modeling of gas bubbles dynamics in liquid under laser radiation in applications for laser surgery and others
- Direct numerical simulations of turbulence from the first principles
- Modern computational methods and modeling of non equilibrium dynamics of inhomogeneous media and quantum informatics

Scientific committee:

Mikhail A. Guzev (IAM FEB RAS, Vladivostok, Russia),
Junnosuke Okajima (IFS Tohoku University, Japan),
Kaoru Maruta (IFS Tohoku University, Japan)
Zinfer R. Ismagilov (Institute of Coal Chemistry and Material Science SB RAS, Russia)
Nikolay N. Smirnov (MSU, Moscow, Russia)
Sergey S. Minaev (IAM FEB RAS, Vladivostok, Russia),
Vladimir V. Gubernov (P.N.Lebedev Physical Institute, Moscow, Russia),
Roman V. Fursenko (ITAM SB RAS, Novosibirsk, Russia),
Valerii I. Babushok (KTC Consulting, Gaithersburg, MD, USA)
Vadim Kurdyumov (Department of Energy, CIEMAT, Madrid, Spain)
Vyasheslav Bykov (Karlsruhe Institute of Technology, Germany)
Gennady V. Alekseev (IAM FEB RAS, Vladivostok, Russia)
Konstantin V. Nefedev (FEFU, Vladivostok, Russia)
Denis A. Knyazkov (ICKC SB RAS, Novosibirsk, Russia)

Organizing committee:

Sergey S. Minaev, Vladimir V. Gubernov, Evgenii P. Dats

Local organizing committee:

Evgenii Dats, Evgenya Abrosimova (VSUES, Russia)

Conference email: minaevss@yahoo.com

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Announcement:

We would like to invite you to participate in the workshop and school of young scientists:
“Theory, experiments and numerical simulations of reaction-diffusion systems in applications for biotechnology, biomedicine and energy production” which will be held in Vladivostok, Vladivostok State University of Economics and Service (VSUES), Russia from 12 to 16 October 2020.

The main idea of the conference is to bring together the leading experts in the field of modelling and computation of reaction-diffusion systems and to facilitate collaboration between them. The development of a universal approach in simulations of different reaction-diffusion systems is the focus of the conference.

The conference will be held in the centre of Vladivostok city, which has great opportunities for sightseeing, yachting, fishing and many more. The program of the seminar will allow the participants to enjoy these possibilities alongside with discussing scientific problems.

The participants are also encouraged to invite other researchers, which might be interested both in the conference topics as well as in the collaboration. The working language of the conference is English.

We would appreciate if you will provide your feedback with confirmation of your interest before long. This will help us much by organization of scientific and social events.

Program

12 October Monday

8:30 - 10:00 **Participants Registration**

10:10 - 10:30 **Opening Address**

10:30 - 12:00 **Plenary Lectures**

10:30 - 11:00

Prof. Junnosuke Okajima (IFS Tohoku University, Japan) "Researches on biomedical applications from the viewpoint of heat transfer" Chair: Dr.Sergey Minaev ([On-line presentation](#))

11:00-11:30

Dr. Sergey Minaev (IAM FEB RAS, Vladivostok, Russia) "The use of "toy" models in numerical simulations of reaction-diffusion systems" Chair: Dr. Vladimir Gubernov ([Live presentation](#))

11:30 - 12:00

Vladimir V. Gubernov (P.N.Lebedev Physical Institute, Moscow, Russia) "Instabilities in reaction-diffusion systems" Chair: Dr. Roman Fursenko ([Live presentation](#))

12:00-13:30 **Lunch**

13:30-16:00 **Sections *Modelling and computational issues of combustion phenomenon***

Chairs: Dr. Roman Fursenko, Dr. Vladimir Gubernov

13:30-13:50

1. Dr. Anatoly Maznoy (TSC SB RAS, Tomsk), "Current status and prospective application of cylindrical radiant burners" ([Live presentation](#))

13:50-14:10

2. Dr. E.V. Sereschenko (ITAM SB RAS, Novosibirsk, Russia), R.V. Fursenko (ITAM SB RAS, Novosibirsk, Russia), "Numerical study of combustion regimes in thermally coupled system with solid phase reaction and premixed gas flame in porous medium" ([Live presentation](#))

14:10-14:40

3. Dr. Alexander A. Kozlov, Anatoly A. Levin (Melentiev Energy System Institute SB RAS, Irkutsk, Russia) "Improvement of solid fuel conversion technology in a multistage gasification plant" ([Live presentation](#))

14:40-15:00

4. Dr. Alexander Kirdyashkin (TSC SB RAS, Tomsk), "Combustion synthesis of condensed inorganic materials" ([Live presentation](#))

15:00-15:20 **Break**

15:20-15:40

5. Dr. Igor Yakovlev (TSC SB RAS, Tomsk), "Pore-scale numerical simulation of the flame stabilization in coarse-pored radiant burners" ([Live presentation](#))

15:40-16:00

6. Mr. V.A. Kosyakov (ITAM SB RAS, Novosibirsk, Russia), V.V. Gubernov, A. A. Shupik, and B.Kichatov (P.N. Lebedev Physical Institute of RAS, Moscow), “Combustion of lean methane-air flames in meso-scale reactor with opposite gas flows” ([Live presentation](#))

16:00-16:20

7. Dr. Sergey Zambalov (TSC SB RAS, Tomsk), “Numerical simulation of hydrogen combustion in a rotary engine” ([Live presentation](#))

16:20-17:00 **Break**

Plenary Lecture

17:00-17:40

Dr. Vyasheslav Bykov (Karlsruhe Institute of Technology, Germany) "On dimension of a combustion system in the composition state space" Chair: Dr. Denis Knyazkov ([On-line presentation](#))

18:30- 22:00 **Welcome party**

13 October Tuesday

10:30 - 12:00 **Plenary Lectures**

10:30 - 11:00

Dr. Denis Knyazkov, (ICKC SB RAS, Novosibirsk, Russia) “Application of flame sampling molecular beam mass spectrometry for studying combustion chemistry of biofuels” Chair: Dr. Vladimir Gubernov ([Live presentation](#))

11:00-11:30

Dr. Andrey M. Shevchenko (ITAM SB RAS, Novosibirsk, Russia) "Problems of simulation of a supersonic wing vortices and interaction with shock" Chair: Dr. Roman Fursenko ([Live presentation](#))

11:30-12:00

Dr. Alexey E. Medvedev (ITAM SB RAS, Novosibirsk, Russia), Prof. V.M. Fomin, Prof. A.M. Cherniavskiy, Yu.M. Prikhodko, M.O. Zhulkov “Mechanics for medicine. Problems of creating an artificial heart” Chair: Dr. Sergey Minaev ([Live presentation](#))

12:00-13:30 **Lunch**

13:30-16:00 **Section *Modeling of gas bubbles dynamics in liquid under laser radiation***

Chairs: Dr. Sergey Minaev, Dr. Vladimir Gubernov

13:30-13:50

1. Dr. Roman V. Fursenko (ITAM SB RAS), “Mechanism of high velocity jet formation after a gas bubble collapse near the micro fiber immersed in a liquid” ([Live presentation](#))

13:50-14:10

2. Dr. Dmitrii A.Tereshko , (IAM FEB RAS, Vladivostok, Russia), “Numerical modeling of heat transfer and fluid dynamics in a cavity under laser heating” ([Live presentation](#))

14:10-14:40

3. Mr. Sergey N. Mokrin (FEFU, Vladivostok, Russia), “Propagation of hot liquid inside the finite volume under local laser heating” ([Live presentation](#))

14:40-15:00

4. Dr. Vladimir Mislavskii (Moscow Institute of Physics and Technology (MIPT)), “Precise laser diagnostics of reactive systems” ([Live presentation](#))

15:00-15:20 **Break**

15:20-16:20 **Section *Dynamic behavior, pattern formation in biological systems***

Chairs: Dr. Sergey Minaev, Dr. Vladimir Gubernov

15:20-15:40

5. Dr. Evgenii Dats (IAM FEB RAS, Vladivostok, Russia), S. S.Minaev, J. Okajima, T. Miroshnichenko, “Sporadic Propagation of Spatiotemporal Patterns in a Plankton Model” ([Live presentation](#))

15:40-16:00

6. Dr. Taisia Miroshnichenko (P.N.Lebedev Physical Institute, Moscow, Russia) “Modeling the dynamics of phytoplankton in the channel with vortex flows” ([Live presentation](#))

16:00-16:20

7. Prof. Alexander Chebotarev, Prof. Andrey E. Kovtanyuk (IAM FEB RAS, FEFU, Vladivostok, Russia), “Analysis and optimization of radiation heat exchange. Application to endovenous laser ablation” ([Live presentation](#))

16:20-16:30 **Break**

16:30-17:10

Prof. Evgenii Volkov (P.N.Lebedev Physical Institute, Moscow, Russia) “The emergence of chaos, hyperchaos and symmetry violation of collective modes in twin and triple identical genetic oscillators similar to patterns of bacterias communication” Chair: Dr. Vladimir Gubernov ([On-line presentation](#))

17:30-20:00

Excursions to Vladivostok, FEFU, FEFU Energy Centre and IC&E Lab

14 October Wednesday

09:30 - 10:30 **Plenary Lectures**

09:30 - 10:30

Aleksei N. Tarasovskii, Boris S. Mazurok, Alexander I. Cherepanov (Institute of Automation and Electrometry SB RAS, Novosibirsk, Russia) “Multi-functional Interactive System for Training based on a Virtual Studio” Chair: Sergey Minaev ([Live presentation](#))

Excursion, Barbeque

15 October Thursday

10:30 - 12:00 **Plenary Lectures**

10:30 - 11:00

Prof. Gennadiy Alekseev, Dr. Roman Briziskii, Ms. Yulia Spivak (IAM FEB RAS, Vladivostok, Russia) “Reaction-diffusion models of virus spread” Chair: Prof. Aleksandr Chebotarev

(Live presentation)

11:00-11:30

Prof. Lev Mazelis, (VSUES, Vladivostok, Russia) "Economic and mathematical modeling of regional human capital development" Chair: Prof. Aleksandr Chebotarev (Live presentation)

11:30-12:00

Prof. Karina Shakhgeldyan, (VSUES, Vladivostok, Russia) “Big data analysis and artificial intelligence in application to biomedicine” Chair: Prof. Konstantin Nefedev (Live presentation)

12:00-13:30 **Lunch**

13:30-15:00 **Section *Modern computational methods and quantum informatics***

Chairs: Prof. Konstantin Nefedev, Dr. Yurii Shevchenko

13:30-13:50

1. Dr. Anton Shershnev (ITAM SB RAS, Novosibirsk, Russia) “Software systems for the numerical simulation of high-speed flows on hybrid CPU/GPU supercomputers, developed at ITAM SB RAS”

(Live presentation)

13:50-14:10

2. Dr. Yurii A. Shevchenko (FEFU, Vladivostok, Russia) “Hybrid Wang-Landau-based algorithm for parallel calculation of density of states for many-body physical systems”

(Live presentation)

14:10-14:40

3. Dr. Ivan Yarovenko, Igor Prokhorov, (IAM FEB RAS, Vladivostok, Russia), "Time-dependent imaging in computed tomography within framework of the radiative transfer equation" (Live presentation)

14:40-15:00

4. Dr. Vitaly Yu. Kapitan (FEFU, Vladivostok, Russia) “New algorithmic approaches for simulation of complex spin systems” (Live presentation)

15:00-15:10 **Break**

15:20-16:30 **Section *Modern computational methods and quantum informatics (15 minute’s presentations)***

Chairs: Prof. Konstantin Nefedev, Dr. Yurii Shevchenko

15:10-15:25

1. Mr. Michail A. Padalko (FEFU, Vladivostok, Russia) “Exact enumeration method in two-dimensional Ising model” (Live presentation)

15:25-15:40

2. Dr. Aleksandr G. Makarov, Makarova K.V. (FEFU, Vladivostok, Russia) “Ground states of the Cairo pentagonal lattice” ([Live presentation](#))

15:40-15:55

3. Mr. Rybin A.E., Kapitan D. Yu. (FEFU, Vladivostok, Russia) “Flat Edwards-Anderson Model in the external magnetic field” ([Live presentation](#))

15:55-16:10

4. Mr. Roman A. Volotovskii (FEFU, Vladivostok, Russia) “Genetic algorithm for the system of magnetic point dipoles on two-dimensional quasi-random spin glass” ([Live presentation](#))

16:10-16:25

5. Mr. Ivan V. Zinchenko, Samoilov V.V. (FEFU, Vladivostok, Russia), “Variable frustrations of Cairo pentagonal lattices” ([Live presentation](#))

16:25-16:40

6. Mr. Ostap V. Bryzgalov (FEFU, Vladivostok, Russia), “Numerical modeling of combustion front movement using the method of discrete elements” ([Live presentation](#))

16:40-17:00 **Break**

Plenary Lecture

17:00-17:40

Dr. Boris V. Kichatov, A.M. Korshunov (P.N.Lebedev Physical Institute, Moscow, Russia)
“Diffusion kinetic modes of biomass torrefaction in a fixed bed mineral filler”

Chair: Dr. Vladimir Gubernov ([On-line presentation](#))

19:00 - 22:00 **Banquet**

16 October Friday

Round table discussions (**IAM FEB RAS, FEFU**)

Farewell party