



## **Mathematics for Innovation: Large and Complex Systems**

The Four Seasons Hotel Tokyo at Chinzan-so,  
Tokyo, Japan

28 February – 4 March 2012

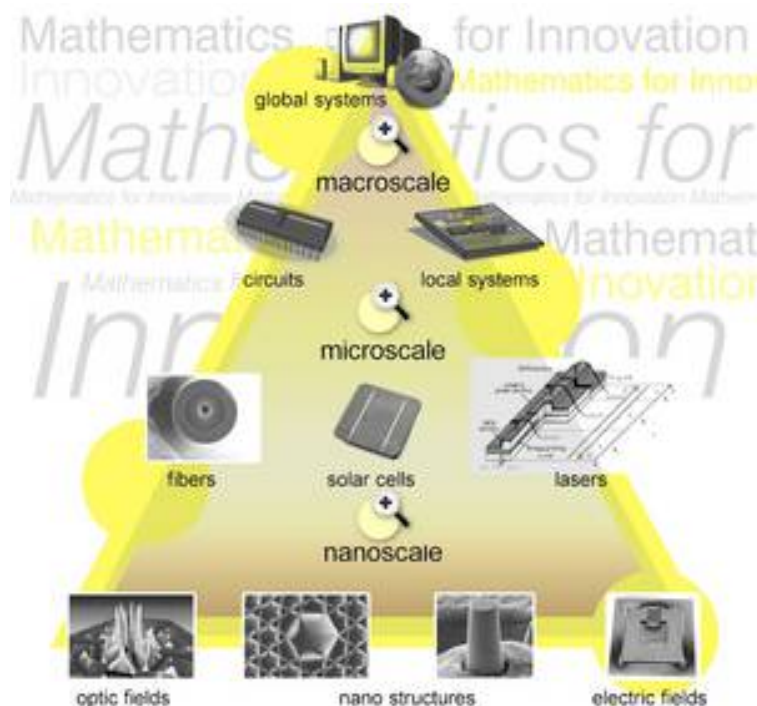
Co-Chairs:

**Yoshiaki Maeda**, Keio University, Japan

**Volker Mehrmann**, Technische Universität Berlin,  
Germany

[www.jsps.go.jp/english/esf-jsp/schedule.html](http://www.jsps.go.jp/english/esf-jsp/schedule.html)

[www.esf.org/activities/esf-conferences/details/2012/  
confdetail397.html?conf=397&year=2012](http://www.esf.org/activities/esf-conferences/details/2012/confdetail397.html?conf=397&year=2012)



## Tuesday 28 February

- 14:00 - 19:00    Arrival and Registration  
19:00 - 21:00    Welcome Reception < Maple Room, 1st floor >  
21:00 - 24:00    Informal Discussion < Le Marquis, 2nd floor >

## Wednesday 29 February

- 7:00 - 9:00    Breakfast < Hickory Room, 4th floor >  
9:00 - 9:20    **Opening Ceremony** < Amphitheater, 4th floor >  
                  Opening Remarks  
                  **TBA**, Japan Society for the Promotion of Science  
                  **Thibaut Lery**, Senior Science Officer of Physical, Engineering and Space  
                  Science Unit, ESF

### **Session 1: Introductory Session**

**Co-Chairs: Yoshiaki Maeda and Volker Mehrmann**

< Amphitheater, 4th floor >

- 9:20 - 9:30    **Session Opening**  
                  Yoshiaki Maeda and Volker Mehrmann
- 9:30 - 10:10    **Franco Brezzi**  
                  Institute for Advanced Study of Pavia, Italy  
                  *Generalized Cochains and applications to Scientific Computing*
- 10:10 - 10:50    **Masayasu Mimura**  
                  Meiji University, Japan  
                  *Mathematics moving towards understanding of self-organization*
- 10:50 - 11:20    Coffee Break
- 11:20 - 12:10    **Michael Griebel**  
                  University of Bonn and Fraunhofer SCAI, Germany  
                  *Efficient numerical methods for high-dimensional problems*
- 12:10 - 13:30    Lunch < Hickory Room, 4th floor >

### **Session 2: Disaster Prevention and Risk**

**Session Chair: Michael Griebel, University of Bonn and Fraunhofer SCAI, Germany**

< Amphitheater, 4th floor >

- 13:30 - 14:20    **Roland Potthast**  
                  German Meteorological Service, Germany and University of Reading, UK  
                  *Modern Data Assimilation for Numerical Weather Prediction*
- 14:20 - 15:10    **Yosihiko Ogata**  
                  Institute of Statistical Mathematics, Japan

*Modeling of earthquake occurrence for predicting seismic activity and discovering seismicity anomalies*

15:10 - 15:40

Coffee Break

15:40 – 16:30

**Nicole El Karoui**

Université Pierre et Marie Curie-Paris VI, France

*Financial Engineering and Stochastic Control*

**Short Talks**

16:30 – 16:45

**Maria Krivko**

University of Leicester, UK

*Numerical integration of Heath-Jarrow-Morton model of interest rates*

16:45 – 17:00

**Takashi Nakazawa**

Okayama University, Japan

*Researches on techniques to investigate structures and transitions of flow fields for higher Reynolds numbers*

17:00 – 17:15

**Michelle Mari De Decker**

Centre de Recerca Matematica, Spain

*Convective transport and effective thermal conductivity of nanofluids: what makes the next-generation coolant*

17:15 - 19:30

**Poster Session I** (Odd Number) < Foyer, 4th floor >

19:30 - 21:00

Dinner < Hickory Room, 4th floor >

21:00 - 24:00

Informal Discussion < Le Marquis, 2nd floor >

## Thursday 1 March

7:00 - 9:00

Breakfast < Hickory Room, 4th floor >

### **Session 3: Mathematics of New Materials**

**Session Chair: Motoko Kotani, Tohoku University, Japan**

< Amphitheater, 4th floor >

9:00 - 9:50

**Tadahisa Funaki**

The University of Tokyo, Japan

*Hydrodynamic limits for large scale interacting systems*

9:50 - 10:40

**Josselin Garnier**

University of Paris Diderot, France

*Correlation-based Imaging in a Complex Environment*

10:40 - 11:10

Coffee Break

**Short Talks**

11:10 – 11:25

**Hirofumi Izuhara**

Meiji University, Japan

*Finite and infinite dimensional relaxation oscillations*

11:25 – 11:40

**Seirin Lee**

RIKEN, Japan

*Self-organisation of Cell Asymmetry*

11:40 - 11:55

**Marcus Wunsch**

ETH Zurich, Switzerland

*Geometry and analysis of mathematical models in fluid mechanics*

11:55 - 12:10

**Makiko Sasada**

Keio University, Japan

*Hydrodynamic limit for exclusion processes with velocity*

12:10 - 12:25

**Hirofumi Notsu**

Waseda University, Japan

*Pressure-stabilized characteristics finite element schemes for flow problems and their two and three dimensional computations*

12:25 - 12:40

**Luz María García-García**

Instituto Español de Oceanografía, Spain

*A mathematical model to predict the water quality of a pit lake*

12:40 - 14:00

Lunch < Hickory Room, 4th floor >

## Session 4:

### Mathematics in Information Science/Electronics/Visualization

Session Chair: **Tetsuya Sakurai, University of Tsukuba, Japan** < Amphitheater, 4th floor >

14:00 - 14:50

**Hirokazu Anai**

Kyushu University and Fujitsu Laboratories, Ltd., Japan

*Computational Real Algebraic Geometry and its Engineering Applications*

14:50 - 15:40

**Peter Markowich**

University of Cambridge, UK and University of Vienna, Austria

*On PDE models for (some) Socio-Economic Problems: Price Formation, Spread of Opinions and Motion of Human Crowds*

15:40 - 16:30

**Habib Ammari**

École Normale Supérieure, France

*Electromagnetic invisibility and super-resolution*

16:30 - 17:00

Coffee Break

### Short Talks

17:00 - 17:15

**Atsushi Iwasaki**

Kyushu University, Japan

*Toward designing combinatorial auction mechanisms for dynamic and uncertain environments*

17:15 - 17:30

**Fabio D'Andreagiovanni**

Zuse-Institut Berlin (ZIB), Germany

*On developing strong 0-1 Programming formulations for Wireless Network Design*

17:30 - 17:45

**Keiji Miura**

Tohoku University, Japan

*An unbiased estimator of noise correlations under signal drift*

- 17:45 - 19:30 **Poster Session II** (Even Number) < Foyer, 4th floor >  
19:30 - 21:00 Dinner < Hickory Room, 4th floor >  
21:00 - 24:00 Informal Discussion < Le Marquis, 2nd floor >

## **Friday 2 March**

- 7:00 - 9:00 Breakfast < Hickory Room, 4th floor >

### **Session 5: Mathematics of Production Engineering**

**Session Chair: Peter Markowich, University of Cambridge, UK and University of Vienna, Austria** < Amphitheater, 4th floor >

- 9:00 - 9:50 **Junichi Nakagawa**  
Nippon Steel Corporation, Japan  
*Creating an Interdisciplinary Platform for Taking Aim at Mathematical Innovation*
- 9:50 - 10:40 **Alfredo Bermúdez de Castro**  
University of Santiago de Compostela, Spain  
*Galerkin lumped parameter methods and applications*
- 10:40 - 11:10 Coffee Break
- 11:10 - 12:00 **Yasumasa Nishiura**  
Hokkaido University, (Tohoku University as of Feb. 2012) Japan  
*Collision Dynamics*
- Short Talks**
- 12:00 - 12:15 **Jonathan Alexander Ward**  
University of Reading, UK  
*Viral spreading in mobile devices*
- 12:15 - 12:30 **Hidetoshi Morita**  
Kyoto University, Japan  
*Collective motion in some conservative systems*
- 12:30 - 12:45 **Marta Benítez**  
University of A Coruña, Spain  
*A second order characteristics finite element scheme for convection-diffusion problems*
- 12:45 - 14:00 Lunch < Hickory Room, 4th floor >  
14:00 - 20:00 Cultural Tour including Dinner  
21:00 - 24:00 Informal Discussion < Le Marquis, 2nd floor >

## **Saturday 3 March**

- 7:00 - 9:00 Breakfast < Hickory Room, 4th floor >

## Session 6: Optimization in Engineering

Session Chair: Gen Nakamura, Hokkaido University, Japan

< Amphitheater, 4th floor >

- 9:00 - 9:50      **Volker Schulz**  
University of Trier, Germany  
*PDE Constrained Shape Optimization in Applications*
- 9:50 - 10:40    **Hideyuki Azegami**  
Nagoya University, Japan  
*Shape optimization for boundary value problems of PDE and its application to mechanical design*
- 10:40 - 11:10    Coffee Break
- 11:10 - 12:00    **Jari Kaipio**  
University of Eastern Finland, Finland and University of Auckland, New Zealand  
*Approximate marginalization over modeling errors and uncertainties in inverse problems*
- Short Talks**
- 12:00 - 12:15    **Goro Akagi**  
Kobe University, Japan  
*Mathematical analysis of nonlinear diffusion*
- 12:15 - 12:30    **Tsuyoshi Yoneda**  
Hokkaido University, Japan  
*On the mathematical analysis of the zonal flow and related topics*
- 12:30 - 12:45    **Azaouzi Mohamed**  
Public Research Center Henri Tudor, Luxembourg  
*Shape optimization of coronary artery stent*
- 12:45 - 14:00    Lunch < Hickory Room, 4th floor >

## Session 7:

### Mathematics in Biology and Life Sciences

Session Chair: Franco Brezzi, Institute for Advanced Study of Pavia, Italy

< Amphitheater, 4th floor >

- 14:00 - 14:10    **Session Opening**  
Franco Brezzi  
Institute for Advanced Study of Pavia, Italy
- 14:10 - 15:00    **Kazuyuki Aihara**  
The University of Tokyo, Japan  
*Dynamical Systems Modelling of Prostate Cancer and its Application to Actual Personalized Therapy*
- 15:00 - 15:30    Coffee Break

## Short Talks

- 15:30 - 15:45 **Julian King**  
University of Vienna, Austria and Austrian Academy of Sciences  
*Real-time measurements and mathematical modeling of breath biomarkers*
- 15:45 - 16:00 **Gouhei Tanaka**  
The University of Tokyo, Japan  
*Network robustness in populations of interacting biological oscillators*
- 16:00 - 16:15 **Thorsten Rohwedder**  
Technische Universität Berlin, Germany  
*On the treatment of high-dimensional optimization tasks by recent tensor formats*
- 16:20 - 17:10 **Takashi Suzuki**  
Osaka University, Japan  
*A PDE approach to biological phenomena*
- 17:10 - 18:00 **Andrew Stuart**  
University of Warwick, UK  
*Probabilistic Inverse Modelling of Complex Systems*

## Closing Session

Session Chair: **Volker Mehrmann**

< Amphitheater, 4th floor >

- 18:10 - 18:40 **Conclusion Discussions  
on Presentations by Young Researchers \***
- 18:40 - 19:30 **Conclusion Panel Discussions**  
1) *EU report on Mathematics and Innovation*  
2) *MSJ report on Mathematics*
- 19:30 - 21:00 Farewell Dinner < Hickory Room, 4th floor >
- 21:00 - 24:00 Informal Discussion < Le Marquis, 2nd floor >

## Sunday 4 March

- 7:00 - 9:00 Breakfast < Hickory Room, 4th floor >  
Departure

\* The "Excellent Presentation Award" and the "Excellent Poster Award" will be awarded to the best presenters of the short talks and posters. Each award will be presented to a European and Japanese participant.