THE 5th SHANGHAI INTERNATIONAL SYMPOSIUM ON NONLINEAR SCIENCES AND APPLICATIONS (Shanghai NSA 2012)
June 27- July 3, 2012, CHINA

Final Program

http://ccsb.fudan.edu.cn/snsa12/
Shanghai NSA 2012

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Shanghai Center for Nonlinear Sciences

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CONTENTS

I. PROGRAM OUTLINE ................................................................................................................ 1
   TIME TABLE FOR LECTURES ........................................................................................ 1
   TIME TABLE FOR ACTIVITIES ON THE CRUISE ...................................................... 3
   Map of Fudan ..................................................................................................................... 6

II. TECHNICAL PROGRAM ........................................................................................................... 7
   June 28 .............................................................................................................................. 7
   June 29 .............................................................................................................................. 10
   July 1 ................................................................................................................................. 13
   July 2 ................................................................................................................................. 15
   Poster ............................................................................................................................... 16

III. CONFERENCE INFORMATION ............................................................................................. 18
   REGISTRATION ................................................................................................................ 18
   ACCOMMODATION .......................................................................................................... 19
   VENUE ............................................................................................................................ 19
   TRANSPORTATION ......................................................................................................... 20
   GENERAL INFORMATION ............................................................................................... 22
   CONTACTS ....................................................................................................................... 23
# I. PROGRAM OUTLINE

## TIME TABLE FOR LECTURES

<table>
<thead>
<tr>
<th>Date</th>
<th>Morning</th>
<th>Noon</th>
<th>Afternoon</th>
<th>Evening</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 27</td>
<td>09:00-12:30 Registration</td>
<td>13:30-17:30 Registration</td>
<td>18:30-19:30 Welcoming Reception</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8:15-8:30 Opening Ceremony</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8:30-10:30 Plenary Talk I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10:30-10:45 Coffee Break</td>
<td>12:15-13:30 Lunch</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10:45-12:05 Plenary Talk II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 28</td>
<td>8:30-10:35 Plenary Talk V</td>
<td>10:40-11:30 Bus to Airport</td>
<td>13:30-15:30 Plenary Talk III</td>
<td>19:00-20:00 Evening Meal</td>
</tr>
<tr>
<td></td>
<td>9:15-10:35 Plenary Talk VI</td>
<td></td>
<td>15:30-15:45 Coffee Break</td>
<td>20:00-21:40 SS-1-I,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15:45-17:45 Plenary Talk IV</td>
<td>20:00-22:00 SS-2</td>
</tr>
<tr>
<td>June 29</td>
<td>8:30-10:35 Plenary Talk V</td>
<td>10:40-11:30 Bus to Airport</td>
<td>13:30-15:30 Flight from Shanghai</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9:15-10:35 Plenary Talk VI</td>
<td></td>
<td>to Yichang</td>
<td></td>
</tr>
<tr>
<td>June 30</td>
<td>09:00-10:00 Sightseeing</td>
<td>14:00-15:20 Plenary Talk VII</td>
<td>18:00-20:00 Farewell Dinner</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15:40-17:40 Plenary Talk VIII</td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 1</td>
<td>07:00-11:30 Sightseeing</td>
<td>12:00-13:00 Lunch</td>
<td></td>
<td>19:00-19:50 Evening Meal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>19:50-20:00 SS-1-II, MS-I,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MS-II</td>
</tr>
<tr>
<td>July 2</td>
<td>08:00-18:00 The one-day trip in Chongqing</td>
<td>14:00-15:20 Plenary Talk VII</td>
<td>18:00-20:00 Farewell Dinner</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arrive in Chongqing</td>
<td>15:40-17:40 Plenary Talk VIII</td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 3</td>
<td>08:00-18:00 The one-day trip in Chongqing</td>
<td>14:00-15:20 Plenary Talk VII</td>
<td>18:00-20:00 Farewell Dinner</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>15:40-17:40 Plenary Talk VIII</td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 4</td>
<td>08:30 Flight from Chongqing to Shanghai</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
June 28

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:15 - 8:30</td>
<td>Rm. A</td>
<td>Opening Ceremony</td>
</tr>
<tr>
<td>8:30 - 10:30</td>
<td>Rm. A</td>
<td>PL-I</td>
</tr>
<tr>
<td>10:45 - 12:05</td>
<td>Rm. A</td>
<td>PL-II</td>
</tr>
<tr>
<td>13:30 - 15:30</td>
<td>Rm. A</td>
<td>PL-III</td>
</tr>
<tr>
<td>15:45 - 17:45</td>
<td>Rm. A</td>
<td>PL-IV</td>
</tr>
<tr>
<td>19:30 – 21:30</td>
<td>Rm. A</td>
<td>IV</td>
</tr>
</tbody>
</table>

June 29

<table>
<thead>
<tr>
<th>Time</th>
<th>Rm. A</th>
<th>Rm. B</th>
<th>Rm. 1</th>
<th>Rm. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 - 10:35</td>
<td>PL-V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:15 - 10:35</td>
<td></td>
<td>PL-VI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20:00 - 22:00</td>
<td></td>
<td></td>
<td>SS-1-I</td>
<td>SS-2</td>
</tr>
</tbody>
</table>

July 1
<table>
<thead>
<tr>
<th>Time</th>
<th>Room 1</th>
<th>Room 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>19:50 - 21:50</td>
<td>SS-1-II</td>
<td></td>
</tr>
<tr>
<td>22:00 – 22:40</td>
<td>MS-I</td>
<td></td>
</tr>
<tr>
<td>20:30 - 21:50</td>
<td></td>
<td>MS-II</td>
</tr>
</tbody>
</table>

**July 2**

<table>
<thead>
<tr>
<th>Time</th>
<th>Room 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00 - 15:20</td>
<td>PL-VII</td>
</tr>
<tr>
<td>15:40 - 17:40</td>
<td>PL-VIII</td>
</tr>
</tbody>
</table>

**Room Abbreviations:**

**Rm. A:** Room 103, the Sub-Building of East Guanghua Tower, Fudan University

**Rm. B:** Room 101, the Sub-Building of East Guanghua Tower, Fudan University

**Rm. 1:** Room 1 (Recreational Deck) on the cruise along the Yangtze River

**Rm. 2:** Room 2 (Recreational Deck) on the cruise along the Yangtze River

**Mini-symposium Abbreviations and Index:**

**MS:** All of the mini-symposiums

**Special Session Abbreviations and Index:**

**SS-1:** Nonlinear Time Series Analysis and Complex Networks

**SS-2:** Remote Sensing Theory and Applications

**TENTATIVE TIME TABLE FOR SOCIAL ACTIVITIES ON THE CRUISE**
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 29</td>
<td>18:00-19:30</td>
<td>Check in Yichang Port and pre-board</td>
</tr>
<tr>
<td></td>
<td>24:00</td>
<td>Depart Yichang</td>
</tr>
<tr>
<td></td>
<td>02:00-03:00</td>
<td>Passing the ship lock of the Gezhou Dam</td>
</tr>
<tr>
<td>June 30</td>
<td>07:00</td>
<td>Breakfast and Morning Coffee</td>
</tr>
<tr>
<td></td>
<td>07:00-09:00</td>
<td>Sail through Xiling gorge (eastern section)</td>
</tr>
<tr>
<td></td>
<td>08:00</td>
<td>Announcement on itinerary and facilities on board</td>
</tr>
<tr>
<td></td>
<td>08:30-10:30</td>
<td>Shore excursion to three gorge dam</td>
</tr>
<tr>
<td></td>
<td>12:00-16:00</td>
<td>Pass the ship locks of the three gorges dam</td>
</tr>
<tr>
<td></td>
<td>16:00-18:00</td>
<td>Sail through Xiling gorge (western section)</td>
</tr>
<tr>
<td></td>
<td>18:00</td>
<td>Welcome banquet held by captain</td>
</tr>
<tr>
<td></td>
<td>20:00</td>
<td>Dancing &amp; singing performance</td>
</tr>
<tr>
<td>July 1</td>
<td>06:30</td>
<td>Breakfast and Morning Coffee</td>
</tr>
<tr>
<td></td>
<td>06:30-09:00</td>
<td>Sailing through the Wu gorge</td>
</tr>
<tr>
<td></td>
<td>09:00-13:00</td>
<td>Badong-shore excursion-drifting in the shennong</td>
</tr>
<tr>
<td></td>
<td>14:30-15:00</td>
<td>Sailing through the Qutang gorge</td>
</tr>
<tr>
<td>July 2</td>
<td>07:00</td>
<td>Breakfast and Morning Coffee</td>
</tr>
<tr>
<td>Time</td>
<td>Activity</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>09:00-11:30</td>
<td>Shore excursion to Fengdu town-“city of devils”</td>
<td></td>
</tr>
<tr>
<td>14:00-17:50</td>
<td>Cultural activities and conference time</td>
<td></td>
</tr>
<tr>
<td>18:00</td>
<td>Farewell Dinner</td>
<td></td>
</tr>
</tbody>
</table>

**July 3**

08:00  Arrive in Chongqing port

- On June 28, the lunch and supper will be served at the Qingyun Hotel. All the registered participants are welcome to have lunch and supper there.

- On **June 29 (10:40 a.m.)**, we will take a shuttle bus to the Pudong airport and then take a flight to the city of Yichang, where we will begin the Yangtze cruise. The shuttle bus to Pudong airport will be parked at the parking lot north to the East Guanghua Tower. We request all the participants could make the checkout of the hotel in that morning. We will prepare a room for participants’ temporarily leaving their luggage in the sub-building of the East Guanghua Tower during the conference time. As for the lunch of that day, we will prepare a pack of cake and dessert for each participant on the shuttle bus.

- There will be some additional social activities during the cruise time. Participation depends on your personal preference. More information will be announced during the cruise.

- If you choose the one-day trip in Chongqing, the trip will begin right after we arrive at Chongqing. The trip consists of two activities: a tour to The Dazu Rock Carvings and a tour of night view of Chonagqing. We will arrange a shuttle bus to the airport for the flight (8:30a.m.) back to Shanghai on July 4.

- If you choose to come back to Shanghai on July 3, we will arrange a shuttle bus to take you together to the airport.
Map of Fudan
II. TECHNICAL PROGRAM

June 28
Morning, June 28

Opening Ceremony
8:15 – 8:30 Welcoming Remarks

Plenary Talk I
8:30 – 10:30, June 28
Chairpersons: Zhewei Zhou, Andreas Dress

8:30 – 9:10
The Many Facets of Chaos
James Yorke (Maryland University, USA)

9:10 – 9:50
Analyzing and Neuron Modelling in Mental Disorders
Jianfeng Feng (Warwick University, UK & Fudan University, P.R. China)

9:50 – 10:30
Phase Transitions towards Self-Organized Criticality in Neuronal Systems
Theo Geisel (Göttingen University, Germany)

10:30 – 10:45 Coffee Break

Plenary Talk II
10:45 – 12:05, June 28
Chairperson: Jianfeng Feng

10:45 – 11:25
Mathematical Modelling of Complex Systems and Its Application to Prostate
Cancer
Kazuyuke Aihara (University of Tokyo, Japan)
11:25 – 12:05
Why Are There Two Sexes?
Andrew Pomiankowski (University College London, UK)

Afternoon, June 28

Plenary Talk III
13:30 – 15:30, June 28
Chairpersons: Kazuyuki Aihara, Albert Goldbeter

13:30 – 14:10
Controlling Complex Networks
Ying-Cheng Lai (Arizona State University, USA & Aberdeen University, UK)

14:10 – 14:50
Cantor Sets Meet the Brain
Ichiro Tsuda (Hokkaido University, Japan)

14:50 – 15:30
Butterfly Effects in “Pattern Space”? The Cooperative Clocks Model
Andreas Dress

15:30 – 15:45 Coffee Break

Plenary Talk IV
15:45 – 17:45, June 28
Chairpersons: Andrew Pomiankowski, Ying-Cheng Lai
15:45 – 16:25
**Biodiversity of Plankton: Non-equilibrium Coexistence of Competing Species**
Ulrike Feudel (Carl von Ossietzky University, Germany)

16:25 – 17:05
**Web Markov Skeleton Processes and their Applications**
Zhiming Ma (Chinese Academy of Sciences, P.R. China)

17:05 – 17:45
**Neural Oscillations in Normal and Pathological Brain Networks**
Mingzhou Ding (Florida University, USA)

**18:00 – 19:30 Supper (Qingyun Hotel)**

**Invited Talk**
**19:30 – 21:30, June 28**
Chairpersons: Jinhu Lü, Wei Lin

19:30 – 20:00
**Multi-Agent Systems: Modeling, Analysis and Control**
Jinhu Lü (Chinese Academy of Sciences, P.R. China)

20:00 – 20:30
**Synchronization in Biological Systems**
Konstantinos Efstathiou (University of Groningen, Netherlands)

20:30 – 21:00
**Study of New Routing Strategy for Complex Networks**
Binghong Wang (University of Science and Technology of China, P.R. China)

21:00 – 21:30
**Analytical Results for Stochastic Gene Models**
Tianshou Zhou (Sun Yat-Sen University, P.R. China)
June 29

Morning, June 29

Plenary Talk V

8:30 – 10:35, June 29, Rm1

Chairpersons: Zhiming Ma, Mingzhou Ding

8:30 – 9:10
Causality Analysis and Functional Connectivity of Neuronal Network Dynamics
David Cai (Shanghai Jiao Tong University, P.R. China & New York University, USA)

9:15 – 9:55
Solving Polynomial Systems
Tien Yien Li (Michigan State University, USA)

9:55 – 10:35
Applied Symbolic Dynamics
Weimou Zheng (Academia Sinica, Taiwan China)

Plenary Talk VI

9:15 – 10:35, June 29, Rm2

Chairperson: Andrew Pomiankowski

9:15 – 9:55
Relation between Convergent Nonlinear Map Dynamics and Harmlessness of Delay in Some Delay Differential Equations
Xingfu Zou (University of Western Ontario, Canada)
9:55 – 10:35
The Dynamics of Genes due to Random Genetic Drift
David Waxman (Fudan University, P.R. China)

10:40 – 15:30 Bus to Airport & Flight to Yichang

17:00 – 19:30 Supper & Check in Yichang Port

Evening, June 29

SS-1-I
20:00 – 21:30, June 29, Rm1
Chairpersons: Yong Zou, Norbert Marwan

20:00 – 20:40 (Invited Talk)
Complex Interaction Patterns and Stability of the Flock: Collective Behaviour of Animal Groups
Michael Small (University of Western Australia, Australia)

20:40 – 21:00
Natural Synchronization of Wireless Sensor Networks base on Noise Induced Phase Synchronization Theory
Mikio Hasegawa (Tokyo University, Japan)

21:00 – 21:20
Heterogeneous Cooperative Leadership Structure Hidden in Homogeneous Random Graphs
Zhihai Rong (Donghua University, P.R. China)
21:20 – 21:40
Exploring the Emergence of Explosive Synchronization in Heterogenous Networks
Ping Li (Southwest Petroleum University, P.R. China)

SS-2

20:00 – 22:00, June 29, Rm2
Chairpersons: Enbo Wei, Guoqing Gu

20:00 – 20:20
Microwave Emissivity of A Sea Foam Layer
Enbo Wei (Chinese Academy of Sciences, P.R. China)

20:20 – 20:40
Boundary Condition Problems of Partial Differential Equations by Transformation Field Method
Guoqing Gu (East China Normal University, P.R. China)

20:40 – 21:00
A Method Of Retrieving Sea Surface Geophysical Parameters By Utilizing Nonlinear Relationship Between Brightness Temperatures And Its Frequencies Of A Multichannel Microwave Radiometer
Zhenzhan Wang (Chinese Academy of Sciences, P.R. China)

21:00 – 21:20
An Sea Ice Concentration Algorithm using LSMM With AVHRR Data
Xuewei Fan (North Sea Branch of State Oceanic Administration of China, P.R. China)

21:20 – 21:40
The Fluorescence Enveloped Area Algorithm for Estimation of Chlorophyll-a Concentration in Turbid Waters Based on In-situ Hyperspectral Data
Chuqun Chen (Chinese Academy of Sciences, P.R. China)

21:40 – 22:00
Radiative Transfer Through Clouds and Its Applications in Support of the Ice, Cloud, and land Elevation Satellite-2 (ICESat-2) Mission
Yuekui Yang (Universities Space Research Association, USA)
July 1

Evening, July 1

SS-1-II

19:50 – 21:40, July 1
Chairpersons: Michael Small, Zhihai Rong

19:50 – 20:30 (Plenary Talk)
Nonlinear Time Series Analysis and Complex Networks
Jürgen Kurths (Potsdam Institute for Climate Impact Research, Germany)

20:30 – 21:10 (Invited Talk)
Complex Network Analysis of Recurrence Plots
Norbert Marwan (Potsdam Institute for Climate Impact Research, Germany)

21:10 – 21:30
Characterizing Phase Coherence by Means of Recurrence Network Approach
Yong Zou (East China Normal University, P.R. China)

21:30 – 21:50
Pattern Classification of Large-scale Functional Brain Networks: Identification of Informative Neuroimaging Markers for Epilepsy
Jie Zhang (Fudan University, P.R. China)

MS-I

22:00 – 22:40, July 1
Chairperson: Jie Zhang

22:00 – 22:20
A Communication Model Based on Novelty-induced Learning
Yongtao Li (Hokkaido University, Japan)
22:20 – 22:40
Intermittent Switching of Phase Differences in Coupled Chaotic Oscillators and Coupled Circle Maps
Yutaka Yamaguti (Hokkaido University, Japan)

MS-1-II

20:30 – 22:30, July 1
Chairpersons: Guoxiang Huang, Jiong Ruan, Guangle Yan

20:30 – 21:10 (Invited Talk)
Decomposing dynamics and its uses in biological modeling and in dynamical system
Ping Ao (Shanghai Jiaotong University, P.R. China)

21:10 – 21:30
Nonlinear localization of light via atomic coherence
Guoxiang Huang (East China Normal University, P.R. China)

21:30 – 21:50
Wavelet Analysis of Abrupt Changes in Chinese Stock Markets
Xingye Li (University of Shanghai for Science and Technology, P.R. China)

21:50 – 22:10
The Characteristics of the Collaborative Interest Network
Ning Zhang (University of Shanghai for Science and Technology, P.R. China)

22:10 – 22:30
Fragility of International Bank Network
Xiaobing Feng (Shanghai Jiaotong University, P.R. China)
July 2

Afternoon, July 2

Plenary Talk VII
14:00 – 17:40, July 2
Chairpersons: Tien Yien Li, Xingfu Zou

14:00 – 14:40
A Few Pieces of Mathematics Inspired by Genomic Data with Emphasis on Unsolved Ones
Bailin Hao (Fudan University, P.R. China)

14:40 – 15:20
Identifying Critical Transitions of Complex Diseases by Dynamical Network Biomarkers
Luonan Chen (Chinese Academy of Sciences, P.R. China)

15:20 – 15:40 Coffee Break

Plenary Talk VIII
15:40 – 17:40, July 2
Chairpersons: Ulrike Feudel, Bailin Hao

15:40 – 16:20
Traffic Jam Generates Phase Transition in Translation
Celso Grebogi (University of Aberdeen, UK)

16:20 – 17:00
Partially Controllable Chaotic Systems: New Results
Miguel Sanjuán (Universidad Rey Juan Carlos, Spain)
17:00 – 17:40
The Circadian Clock and the Cell Cycle: Nonlinear Dynamics of Two Coupled Cellular Oscillators
Albert Goldbeter (Université Libre de Bruxelles, Belgium)

17:40-18:00  Closing Remark

**Poster Section**

14:00 – 22:00, June 28

**Venue:** The Sub-Building of the East Guanghua Tower, Fudan University

Evaluation of clinical efficacy of traditional Chinese medicine treatment based on information entropy
Guangle Yan (University of Shanghai for Science and Technology, P.R. China)

Complex networks from experimental horizontal oil-water flows: community structure detection versus flow pattern discrimination
Zhongke Gao (Tianjin University, P.R. China)

Adaptive modified function projective lag synchronization of spatiotemporal chaos with uncertain parameters
Yuan Chai (Shanghai Institute of Applied Mathematics and mechanics, P.R. China)

Relativistic nonlinearity in the stability of multiply-charged negative ions in intense high-frequency laser fields
Jiaxiang Wang (East China Normal University, P.R. China)

The dynamics of memory retrieval in the neural networks of Pinsky-Rinzel type of neurons
Hiromichi Tsukada (Hokkaido University, Japan)

Analysis of regional characteristics of extreme rainfall over the eastern Asia using complex networks
Zhiqiang Gong (National Climate Center, P.R. China)

Three-dimensional air-sea interactions investigated with bilayer networks
Aixia Feng (Lanzhou University, P.R. China)
Stabilizing oscillations via asymmetric feedback control with time delay
Yang Pu (Fudan University, P.R. China)

Criticality and disconnection hypothesis in schizophrenia
Bing Xu and Ye Yao (Fudan University, P.R. China)

The efficiency of random and fast switch in complex dynamical systems with or without time delay
Yao Guo (Fudan University, P.R. China)

Will a large complex system with time delay and asymmetric coupling be stable?
Wenbo Sheng (Fudan University, P.R. China)

Identification of fractional-order systems
Xiaoxi Ji and Yu Wu (Fudan University, P.R. China)

Transverse stability of random dynamical system
Xiangnan He (Fudan University, P.R. China)

Phase portraits of fractional differential system with Riemann-Liouville derivative
Xiaoxi Ji (Fudan University, P.R. China)

Unveiling Dynamical Regimes of Time Series
Chenyang Tao (Fudan University, P.R. China)
III. CONFERENCE INFORMATION

REGISTRATION

Could all participants please register at the earliest opportunity.

The registration desk will be open at the Lobby of Fu-Xuan Hotel, 400 Guoding Road, Shanghai, on Friday June 27th from 09:30–17:30. There will also be an opportunity to register in Room 103 of the Sub-Building of the East Guanghua Tower, on Saturday June 28th from 08:00-09:30.

If you have completed advanced registration process, your conference materials await collection at the Conference Registration Desk.

REGISTRATION FEE

The registration fee is **620 US Dollars** for regular participants. This will cover a copy of the abstract book, reception, coffee and tea breaks, daily lunches, the conference banquet.

The registration fee for students and family member is **570 US Dollars**. This will cover a copy of the abstract book, reception, coffee and tea breaks, daily lunches, the conference banquet.

PAYMENT

All payments, including registration fee, accommodation and excursions, should be made in Yuan, US dollars, Euros, Pounds, or Japanese Yen at the Registration Desk.

RECEIPT OF REGISTRATION

Please contact the financial secretary by E-mail when you pay. A formal receipt will be handed out at the Registration Desk with the registration packets during the conference.

CERTIFICATE OF ATTENDANCE

If you require a Certificate of Attendance, please contact staff at the registration desk.
ACCOMMODATION
Accommodation will be arranged at *Fu-Xuan Hotel* and *Fudan Qingyun Hotel*. These are located near the main campus of Fudan University, which holds the conference venue. The conference will provide the participants with a special rate for rooms, discounted only for the conference. At Fuxuan hotel, the price for a KING SIZE ROOM is **430 RMB** per night (including one breakfast) and a STANDARD ROOM (double room or twin room) is **480 RMB** per night (including two breakfasts). At *Fudan Qingyun Hotel*, the price for a STANDARD ROOM (double room or twin room) is **370 RMB** per night (including two breakfasts).

VENUE
From June 27th to June 29th’s morning, our conference will take place in the Guanghua Buildings, which are located in the Handan Campus of Fudan University, 220 Handan Road, Shanghai, China. From June 29th’s afternoon to July 3rd, our conference will transfer to the cruise along the Yangtze River.

Internet Service
At the conference site (both at Fudan University and on the cruise), wireless internet service will be provided. The account and password are available at the registration desk upon the request.
TRANSPORTATION
HOW TO REACH THE VENUE

From Airport To Fudan University (Handan Campus):

Hongqiao Airport:
1. Taxi to Fudan University costs roughly RMB 90.
2. Take a Metro Line 10 to Wu Jiao Chang Stop (五角站), which costs RMB 7, and then walk (approximately 15 minutes to the Centre).

Pudong International Airport:
1. Taxi to Fudan University costs roughly RMB 160.
2. Shuttle Bus Line 4 (机场四线) to Wu Jiao Chang Stop (五角场), which costs RMB 20, and then walk (approximately 15 minutes to the Centre).

From Train Station To Fudan University (Handan Campus):

Shanghai Railway Station:
1. Get out from the South Exit of the Railway Station and then take a taxi to Fudan University, which costs roughly RMB 30.
2. Get out from the North Exit of the Railway Station and then take a No. 942 Bus to Fudan University Stop (复旦大学).

Shanghai South Railway Station:
Take a Metro Line 3 to Chifeng Road Stop (赤峰路) and then transfer to No. 139 or 854 or 942 or 991 Bus to Fudan University Stop (复旦大学).

Hongqiao Railway Station:
Take a Metro Line 10 to Wu Jiao Chang Stop (五角站), which costs RMB 7, and then walk (approximately 15 minutes to the Centre).
Please show the following poster to the taxi driver, if you arrive at Shanghai and intend to take a taxi at the airport or at the railway station to Fudan University.

Please take me to: Fuxuan Hotel
Address: 400 Guoding Road, Shanghai, China
(Handan Campus, Fudan University)
Contact: 86-21-55589518

请把我送到：
复宣宾馆
地址：上海市国定路400号（复旦大学邯郸校区）
联系电话: 86-21-55589518

Please take me to: Fudan Qingyun Hotel
Address: 220 Handan Road, Shanghai, China
(Handan Campus, Fudan University)
Contact: 86-21-65103300

请把我送到：
复旦卿云宾馆
地址：上海市邯郸路220号（复旦大学邯郸校区内）
联系电话: 86-21-65103300
GENERAL INFORMATION

MESSAGE BOARD
Any announcements on changes in the conference schedule will be posted on a message board located by the Shanghai NSA 2012 Registration Area. Please check the message board, if you are expecting messages.

CONFERENCE WEBSITE
Shanghai NSA 2012 website at http://ccsb.fudan.edu.cn/snsa12/ contains up-to-date information on the program, transportation, conference registration, hotel reservation, tours, and other services.

CURRENCY
The Chinese currency uses a decimal system. Notes come in denominations of RMB (Yuan) 100, 50, 20, 10, 5, 2 and 1. Coins are 1, 5 Jiao and 1 Yuan. Banks are open from 9:00am to 12:00am and 1:00pm-4:00 pm during Monday - Saturday. Traveler's checks in foreign currencies can be cashed by banks and hotels but are not usually accepted in shops. The exchange rate is subject to market fluctuations.

CREDIT CARDS
Credit cards, including VISA, American Express, Diners Club, Master Card, and JCB, are accepted at major hotels, department stores, and the larger restaurants.

ELECTRICITY
In China, outlets are only for 220 volts. Overseas delegates bringing laptop computers and other electrical appliances are advised to check whether a transformer is required.

PASSPORT AND VISA
Foreigners wishing to enter the People’s Republic of China should have a valid passport. Visitors should obtain entry visa before coming to China. The Visa Notification or our invitation letter, which we mail you, has been prepared especially for your application of a visa. For visitors from Japan and a few other countries, if they only stay in China within 2 weeks, no visa is needed. However, please check before your coming to China.
CONTACTS

Wei Lin, Professor
Centre for Computational Systems Biology,
School of Mathematical Sciences,
Research Center for Nonlinear Sciences,
Fudan University, Shanghai 200433, China
Contact Phone Number: +86-21-5566-5141

Qianyi Zhang, Secretary
Centre for Computational Systems Biology,
Fudan University, Shanghai 200433, China
Contact Phone Number: +86-21-5566-5546
Email: zqy@fudan.edu.cn
Supplementary Abstract Book
Decomposing dynamics and its uses in biological modeling and in dynamical system

Ping Ao
Shanghai Center for Systems Biomedicine and Department of Physics
Shanghai Jiao Tong University, Shanghai, China
aoping@sjtu.edu.cn

During our biological study a new perspective on nonlinear (stochastic) dynamics has emerged. The key procedure is the decomposition of dynamics into three important pieces: Potential function (Lyapunov function); detailed balance dynamics; conservative dynamics. For biological modeling, the potential function provides a direct quantification of stability and robustness, which has been applied to various biological problems such genetic switch and cancer dynamics modeling. Surprisingly (at least to us), it also has implications back on the related mathematical theory of dynamical systems. For example, it allows the possibility to understand limit cycle and chaotic dynamics from very different angles. In addition, we may have for the first time constructed the Lyapunov function for chaotic systems.

REFERENCES

The stability of oscillation in delay-coupled network of oscillators generally depends in a complicated way on the coupling topology of the network. Here we investigate the effect of the coupling matrix of coupled oscillators, from both theoretical investigations and numerical calculations. We use a normal form of the supercritical Hopf bifurcation, subjected to one kind of feedback control, with time delay, as our model. It can be demonstrated that a symmetric coupling matrix cannot stabilize the oscillations near the equilibrium for some oscillation frequency. This suggests only an asymmetric coupling matrix is valid for successful stabilization. Specially, when the oscillation frequency related to the given system is located in some interval, only unstable feedback control instead of stable feedback control can work for stabilizing the oscillation. We utilize the numerical study of delay-coupled FitzHugh-Nagumo model as an example to confirm our results. Our findings allow the understanding of complex dynamics in delay-coupled systems.
Criticality and Disconnection Hypothesis in Schizophrenia

Bing Xu¹, Ye Yao¹, Yuguo Yu¹, Gustavo Deco², Karl Friston³, Jianfeng Feng¹,⁴
¹Centre for Computational Systems Biology, Fudan University, Shanghai, PR China
²Computational Neuroscience Group, Departament of Technology, Universitat Pompeu Fabra, RocBoronat, 138, E-08018 Barcelona, Spain
³Wellcome Trust Centre for Neuroimaging, Institute of Neurology, University College London, 12 Queen Square, London WC1N3BG, UK
⁴Centre for Scientific Computing, Warwick University, Coventry CV4 7AL, UK
xub@fudan.edu.cn
yyao@fudan.edu.cn

The view that schizophrenia is not caused by focal brain abnormalities, but results from pathological interactions between brain regions, is an influential idea in schizophrenia research. It is appropriate to link brain dynamics at rest, to a constant inner state of exploration, in which the brain generates predictions about the likely network configuration that would be optimal for a given impending input. By a computational approach, we confirm that slow fluctuating resting state networks emerge as structured noise fluctuations, around a stable low firing activity equilibrium state in the presence of latent “ghost” multi-stable attractors. Thus, the normal brain is operating in the vicinity of the critical point. The case is different for a schizophrenic brain. Even in the absence of stimulation or task, the brain network wanders from one attractor to another under background noise. This may explain the symptoms of schizophrenia patients, that exhibit “splitting” of different mental domains.
The Efficiency of Random and Fast Switch in Complex Dynamical Systems with or without Time Delay

Yao Guo\textsuperscript{1*}, Wei Lin\textsuperscript{1} and Miguel A. F. Sanjuán\textsuperscript{2}

\textsuperscript{1}Computational Center for Systems Biology and School of Mathematical Sciences, Fudan University, Shanghai 200433, China

\textsuperscript{2}Nonlinear Dynamics, Chaos and Complex Systems Group, Departamento de Física, Universidad Rey Juan Carlos, Tulipán s/n, 28933 Móstoles, Madrid, Spain

yguo@fudan.edu.cn

We show that a fast switch is able to lead a complex dynamical system with or without time delay to being asymptotically stable, though this system is completely unstable in every switch duration and even the associated connection matrices are randomly selected. Significantly, we define some new exponents by which we can figure out the essential patterns that guarantee the stability of fast switching systems, and besides their calculations need little computational cost. More interestingly, we show the efficiency of some random switches in inducing stability through a comparison of the systems with different switch connection matrices and switch durations, and give a design method for obtaining higher efficient random switch rules. Indeed, we provide several examples to show the practical usefulness of the obtained theoretical results.
Large dynamical systems with complex interaction arise in many fields including physics, biology and engineering. In 1972, May investigated the stability of a large linear dynamical system with random coupling that applies to a complex ecological network [1]. May analyzed the case of independent random interactions and considered stability criteria in terms of the system’s size and other parameters. Since then, with the development of theory of random matrices [2,3], May's model has been generalized and discussed widely. Recently, Allesina and Tang [4] extended May's ecological model and results to the case of asymmetric coupling, for example, predator-prey models, mutualistic or competitive models, and provided analytic stability criteria. Another natural generalization is to consider a system with time delay[5].

Here we combine these ideas together and investigate the behaviour of a large complex system with asymmetric random coupling and time delay. Specifically, we consider the model $x(t) = -x(t) + Ax(t - \tau)$. Assuming the entries $a_{ij}$ of A are random variables with mean zero, variance $\sigma_2$ and a correlation coefficient $\rho$ between $a_{ij}$ and $a_{jk}$, we find that under different values of $\rho$ and the system size N, the asymptotic behavior of the systems can be divided into three types: absolutely stable, absolutely unstable, both of which are independent of the time delay, and conditional stable with time delay. Generally speaking, when $\rho$ is negative, the system may ‘resist’ the tendency of instability with the increasing of the size N. Compared with Jirsa and Ding's previous work, we suggest that the system has some different and more complicated properties with a negative interaction. In addition, we have also carried out some numerical simulations to demonstrate our theoretical results. Further analysis is continuing, including systems with distributed time delays.

REFERENCES

Identification of Linear Fractional-Order Systems

Xiaoxi Ji\textsuperscript{1}, Yu Wu\textsuperscript{1,2}, Wenbo Sheng\textsuperscript{1}, Wei Lin\textsuperscript{1*}, Jianfeng Feng\textsuperscript{1,2}

\textsuperscript{1}Centre for Computational Systems Biology and School of Mathematical Sciences, Fudan University, Shanghai 200433, China.
\textsuperscript{2}Centre for Scientific Computing and Computer Science, Warwick University, UK.
\texttt{wlin@fudan.edu.cn}

Although classical calculus has played a dominant role in explaining and modeling important dynamic processes in the applied sciences, fractional calculus has gradually attracted the attention of scientists during the last two decades. Instead of integer-order derivatives, fractional derivatives were utilized to describe the models associated with non-local dynamics and memory effects. Typical examples include the studies on viscoelastic materials, polymer physics, electrical circuits, electroanalytical chemistry, and fractional diffusion equations (for a review, see [1]). Additionally, fractional derivatives were also applied in engineering problems such as fractional-order controllers, of dynamical systems [2].

The advantage of fractional-order systems (FOSs) over classical integer-order systems in characterizing real-world systems with anomalous behaviors motivates the development of the identification of FOSs. This paper is devoted to the identification of linear higher-dimensional FOSs with sparse structure. The reason for identifying such FOSs lies in the facts that: 1. Many of the studies mentioned above were performed on the basis of linear FOSs; 2. homogeneous sequential linear fractional-order differential equations (HSLFDE), are an important class of FOSs, and are incorporated in the framework of this work, which can be transformed into linear FOSs with sparse structure; 3. Often a linear FOS with sparse structure would be the first approach to fitting an experimental dataset [3] and capturing the most essential mechanisms.

In contrast to integer-order models, identifying a system with given data is more difficult when the system is characterized by fractional-order differential equations (FDEs). Many approaches have been proposed to approximate the transfer function of a one-dimensional FDE by a rational function [4]. One of the most popular approaches is the Oustaloup's method [5], which approximates the infinite--dimensional pure differentiator operator $s^\alpha$ by means of a rational filter. Motivated by this work, alternative approaches emerged (such as [6] and [7]) which shared the common idea of identifying one-dimensional systems with knowledge of their responses to stimuli.
From a new perspective on this issue, a novel approach is presented here to deal with linear higher-dimensional FOSs with sparse structure. Owing to the sparsity of the systems, the identification employs a compressed sensing technique, which was originally conceived to decompose a signal into an 'optimal' superposition of overcomplete systems [8-11]. This was recently utilized to identify nonlinear integer-order dynamical systems [12].

The FOS in the framework of this study is described by

\[ D^\alpha_0 x(t) = Ax(t), \]

where \( \alpha \in (0,1] \), \( x(t) \in \mathbb{R}^n \) for \( t \in [0,T] \), \( A = (a_{ij}) \in \mathbb{R}^{n \times n} \) is a non-singular sparse matrix, and \( D^\alpha_t \) is a fractional differential operator. There are two main classes of fractional derivatives: the Riemann–Liouville derivative of order \( \alpha \), defined as [1,13]

\[
D^\alpha_0 f(t) = \frac{1}{\Gamma(n-\alpha)} \left( \frac{d}{dt} \right)^n \int_0^t \frac{f(\tau)}{(t-\tau)^{\alpha-n+1}} d\tau,
\]

and the Caputo derivative, defined as [14]

\[
D^\alpha_C f(t) = \frac{1}{\Gamma(n-\alpha)} \int_0^t \frac{f^{(n)}(\tau)}{(t-\tau)^{\alpha-n+1}} d\tau,
\]

where \( n \) is an integer chosen in such a way that \( n - 1 \leq \alpha < n \). The identification of the linear system in the sense of the Riemann–Liouville derivative is more difficult because the system requires initial conditions expressed in terms of initial values of fractional derivatives of the unknown solution [PodlubnyBook,Samko, 1993]: \( D^\alpha_0 x(t) \big|_{t=0} = 0 \), whereas the initial conditions for the Caputo derivative are expressed in terms of initial values of integer order derivatives. Moreover, the solution of the linear system in the sense of the Riemann–Liouville derivative is singular at \( t = 0 \), which further complicates the identification process. For the above reasons, we aim to identify the linear FOS with sparse structure in the sense of the Riemann–Liouville derivative with the initial conditions expressed as:

\[
\begin{align*}
0 D^\alpha_0 x(t) &= Ax(t), \\
0 D^\alpha_0 x(t) \big|_{t=0} &= x_0,
\end{align*}
\]

but the approach can be easily applied to FOSs in the sense of the Caputo derivative with slight revision.

REFERENCES
Transverse Stability of Random Dynamical System

Xiangnan He, Wenlian Lu and Tianping Chen
Center for Computational Systems Biology, Laboratory of Mathematics for Nonlinear Sciences,
Fudan University, Shanghai, China.
seanhe2007@gmail.com

We here study the transverse stability of random dynamical systems (RDS). Suppose a RDS on a Riemann manifold possesses a non-random invariant submanifold, what conditions can guarantee that a random attractor with respect to the whole manifold? By the linearization technique, we prove that if all the normal Lyapunov exponents with respect to the tangent space of the submanifold are negative, then the attractor on the submanifold is also a random attractor of the whole manifold. This result extends the idea of the transverse stability analysis of deterministic dynamical systems. As an explicit example we discuss the complete synchronization in network of coupled maps with both stochastic topologies and maps, which extends the well-known master stability function (MSF) approach for deterministic cases to stochastic cases.
Phase Portraits of Fractional Differential System with Riemann-Liouville Derivative

Xiaoxi Ji and Wei Lin
School of Mathematical Sciences, Centre for Computational Systems Biology, Fudan University, China
xiaoxiji@fudan.edu.cn
wlin@fudan.edu.cn

Recently, fractional calculus has attracted much attention since it plays an important role in many fields. Typical examples include the studies on viscoelastic physics, electrical circuits, and engineering problems. Thus, research about the phase portraits of fractional order systems is required and important. In this work, a novel classification of singular points in fractional-order differential equations is proposed for analyzing and understanding properties of systems associated with Riemann-Liouville. Generally, equilibrium points show totally different characters from classical, integer-order, differential equations. The paper is composed of two main parts. In the first part, some general theorems about the existence and uniqueness of global solution of the fractional-order system are established. In the second part, the classification of singular points is established and simulation results are listed to establish our findings.
Unveiling Dynamical Regimes of Time Series

Chenyang Tao and Jianfeng Feng
Computational Center for Systems Biology, Fudan University, Shanghai, China
11210700135@fudan.edu.cn

One crucial challenge facing the researchers dealing with real world data is that real world system always tends to constantly switching between different dynamical regimes, which may violate the assumptions of the analysis they take. In this work, we propose a general method that tries to attack this challenge in a probability framework. To be specific, we first embed the time series into a state space according to certain specified (prior knowledge) or general rule. Then the empirical transition matrix $M$ of the states is built according to the evolution of the trajectory in the state space. Now we can regard the system as a Markov chain with transition matrix $M$, a hierarchical clustering scheme based on the Markov chain is performed on the $M$ which reveals the meta-stable clusters, which corresponds to different dynamical regimes of the original system, hierarchically. In practice, certain iterative scheme might be necessary to refine the result. Numerical experiments confirmed that our approach accurately and robustly identifies the underlying dynamical regimes of toy models. Also, correspondences between different time series that reluctant to classic methods are resolved in this approach. This is still an on-going work, we are continuing to work out the challenges presented in the embedding procedure that jeopardizes the resolution of state space, and try to provide theoretical justifications.