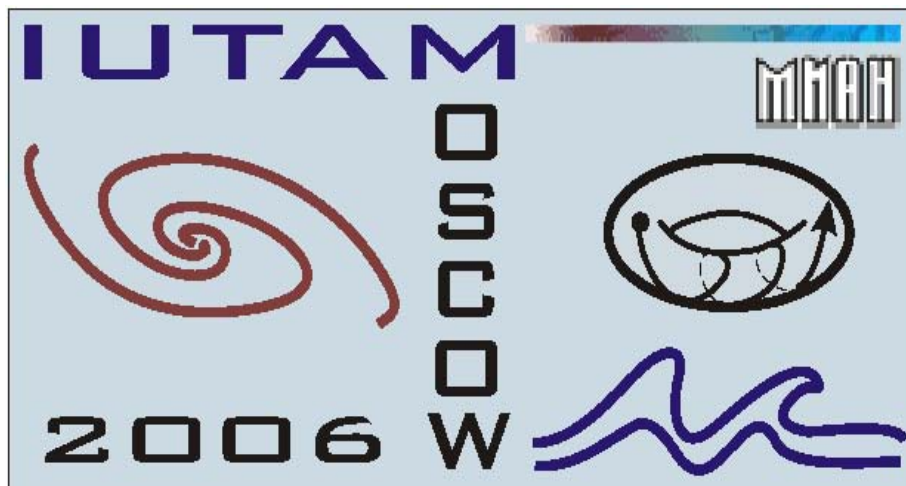


**IUTAM SYMPOSIUM**

**HAMILTONIAN DYNAMICS**

**VORTEX STRUCTURES**

**TURBULENCE**



**PROGRAMME**

**STEKLOV MATHEMATICAL INSTITUTE OF RAS**

**MOSCOW**

**25-30 AUGUST 2006**

**SPONSORED BY:**

**International Union of Theoretical and Applied  
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**IUTAM SYMPOSIUM ON HAMILTONIAN DYNAMICS, VORTEX STRUCTURES, TURBULENCE**  
**MOSCOW, 25-30 AUGUST 2006**

**PROGRAMME OVERVIEW**

| <b>Thursday<br/>24.08.06</b>  | <b>Friday<br/>25.08.06</b>   | <b>Saturday<br/>26.08.06</b>                          | <b>Sunday<br/>27.08.06</b> | <b>Monday<br/>28.08.06</b>       | <b>Tuesday<br/>29.08.06</b>   | <b>Wednesday<br/>30.08.06</b>    |
|-------------------------------|------------------------------|---|----------------------------|----------------------------------|-------------------------------|----------------------------------|
|                               | <b>9:30<br/>Registration</b> | 10:00 P1.2<br>Y. Fukumoto                             | <b>10:00<br/>Excursion</b> | 10:00 L1.4<br>V. Berdichevsky    | 10:00 L1-2.5<br>J.-B. Flor    | 10:00 L1.6<br>C. Staquet         |
|                               | 10:00 W1.1<br>D. Treschev    |   |                            | 10:20 L2.4<br>S. Fedotov         | 10:20 L3.5:<br>J. Sommeria    | 10:20 L2.6<br>M. Budyansky       |
|                               | 10:10 W2.1<br>K. Moffatt     | 10:40 P2.2<br>C. Lim                                  |                            | 10:40 L3.4<br>R. Stepanov        | 10:40 L4.5<br>X.-L. Xie       | 10:40 L3-4.6<br>G. Sutyryn       |
|                               | 10:20 P1.1<br>K. Moffatt     |   |                            | 11:00 L4.4<br>A. Gourjii         | 11:00 L5.5<br>S. Lukaschuk    | 11:00 L5.6<br>X. Carton          |
|                               | 11:00 P2.1<br>V. Zakharov    | 11:20 P3.2<br>S. Ramodanov                            |                            | 11:20 L5.4<br>S. Badulin         | 11:20 L6.5<br>E. Kudashev     | 11:20 L6.6<br>A. Petrosyan       |
|                               | <b>11:40 Break</b>           | <b>12:00 Break</b>                                    |                            | 11:35 L6.4<br>A. Vul'fson        | 11:40 L7.5<br>V. Okulov       | 11:40 L7.6<br>K. Koshel          |
|                               | 12:00 P3.1<br>H. Aref        | 12:20 P4.2<br>Z. Kizner                               |                            | <b>11:55 Break</b>               | <b>12:00 Break</b>            | <b>12:00 Break</b>               |
|                               | 12:40 P4.1<br>Y. Kimura      | 13:00 P5.2<br>S. Kida                                 |                            | 12:15 L7.4<br>S. Bolotin         | 12:20 L8.5<br>N. Batkhina     | 12:20 L8.6<br>S. Sigalov         |
|                               | 13:20 P5.1<br>V. Vladimirov  | 13:40 P6.2<br>GJ. van Heijst                          |                            | 12:35 L8.4<br>J. Koiller         | 12:40 L9.5<br>A. Il'ichev     | 12:40 L9.6<br>D. Cherniy         |
|                               | <b>14:00 Lunch</b>           | <b>14:20 Lunch</b>                                    |                            | 12:55 L9.4<br>O. Koltsova        | 13:00 L10.5<br>I. Bakholdin   | 12:55 L10.6<br>O. Derzho         |
| <b>14:00<br/>Registration</b> | 15:00 P6.1<br>V. Meleshko    | 15:20 P7.2<br>G. Zaslavsky                            | <b>Free time</b>           | 13:15 L10.4<br>V. Goncharov      | 13:20 L11.5<br>A. Shvets      | 13:15 L11.6<br>G. Panasenko      |
|                               | 15:40 P7.1<br>G. Iooss       | 16:00 P8.2<br>S. Wiggins                              |                            | <b>13:35 Lunch</b>               | <b>13:35 Lunch</b>            | <b>13:35 Lunch</b>               |
|                               |                              | <b>16:40 Break</b>                                    |                            | 14:35 L11.4<br>K. O'Neil         | 14:35 L12.5<br>R. Shamin      | 14:35 L12.6<br>S. Muzylev        |
|                               | 16:20 P8.1<br>G. Reznik      | 17:00 P9.2<br>N. Paldor                               |                            | 14:55 L12.4<br>E. Milyute        | 14:55 L13.5<br>K. Volosov     | 14:55 L13.6<br>V. Zyryanov       |
|                               | 17:00 P9.1<br>A. Neishtadt   | 17:40 P10.2<br>V. Kozlov                              |                            | 15:15 L13.4<br>O. Bakunin        | 15:15 L14.5<br>D. Blackmore   | 15:15 L14-15.6<br>M. Sokolovskiy |
|                               | <b>18:00<br/>Banquet</b>     | <b>18:20<br/>V. Yudovich<br/>Memorial<br/>Session</b> |                            | 15:35 L14.4<br>A. Kilin          | 15:35 L15.5<br>S. Suetin      |                                  |
|                               |                              |   |                            | 15:55 L15.4<br>L. Zannetti       | 15:55 L16.5<br>N. Denisova    |                                  |
|                               |                              |   |                            | <b>16:15 Break</b>               | <b>16:15 Break</b>            | <b>15:35<br/>Coffee-Tea</b>      |
|                               |                              |   |                            | 16:35 L16.4<br>L. Kurakin        | 16:35 L17.5<br>A. Wirth       |                                  |
|                               |                              |   |                            | 16:55 L17.4<br>L. Barba          | 16:55 L18.5<br>P. van Leeuwen |                                  |
|                               |                              |   |                            | 17:15 L18.4<br>T. Krasnopolskaya | 17:15 L19.5<br>A. Hinds       |                                  |
|                               |                              |   |                            | 17:30 L19.4<br>S. Maslowe        | 17:35 L20.5<br>P. Caillol     |                                  |
|                               |                              |   |                            | 17:50 L20.4<br>B. Shashikanth    | 17:55 L21.5<br>S. Medvedev    |                                  |

• **DAY 0: THURSDAY, 24 AUGUST**

14:00 – 19:00                    **Registration**

• **DAY 1: FRIDAY, 25 AUGUST**

9:30 – 10:00                    **Registration**

**Opening session** Chairman: Jacques Verron

10:00 – 10:10    W1.1    Welcome by Deputy Director of Steklov Mathematical Institute  
Corresponding Member of RAS Dmitry Treschev

10:10 – 10:20    W2.1    Welcome remarks by Vice-President of IUTAM and IUTAM  
Representative on Scientific Committee Keith Moffatt

10:20 – 11:00    P1.1    Keith Moffatt (UK) Opening lecture 1 *Vortex structures: the legacy of  
Helmholtz and Kelvin*

11:00 – 11:40    P2.1    Vladimir Zakharov (Russia, USA) Opening lecture 2 *Dynamics of  
almost parallel vortex lines*

11:40 – 12:00                    **Break**

**Plenary session-1** Chairman: Peter Davies

12:00 – 12:40    P3.1:    Hassan Aref (USA) *Vortex dynamics of wakes*

12:40 – 13:20    P4.1    Yoshifumi Kimura (Japan) *Motion of an elliptic vortex ring and  
particle transport*

13:20 – 14:00    P5.1    Vladimir Vladimirov (UK) *Vibrodynamics of solid+fluid*

14:00 – 15:00                    **Lunch**

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**Plenary session-1 (continue)** Chairman: Yasuhide Fukumoto

- 15:00 – 15:40 P6.1 Vyacheslav Meleshko (Ukraine) *Near wall control and transport properties of two-dimensional vortex structures*
- 15:40 – 16:20 P7.1 G rard Iooss (France) & Pavel Plotnikov (Russia) *Three-dimensional double-periodic travelling gravity water waves*
- 16:20 – 17:00 P8.1 Gregory Reznik (Russia) & Vladimir Zeitlin (France) *Nonlinear dynamics of semi-transparent equatorial waveguide*
- 17:00 – 17:40 P9.1 Anatoly Neishtadt (Russia) *On adiabatic invariance in volume-preserving systems*

**End of Plenary session-1**

18:00 – 22:00 **Banquet**

• **DAY 2: SATURDAY, 26 AUGUST**

**Plenary session-2** Chairman: Nathan Paldor

- 10:00 – 10:40 P1.2 Yasuhide Fukumoto (Japan) *Analogy of a vortex-jet filament with the Kirchhoff elastic rod and its dynamical extension*
- 10:40 – 11:20 P2.2 Chjan Lim (USA) *Stability and phase transition to super-rotation in barotropic vortex dynamics on a rotating sphere*
- 11:20 – 12:00 P3.2 Alexey Borisov, Ivan Mamaev & Sergey Ramodanov (Russia) *Motion of rigid bodies and vortex structures in a perfect fluid*

12:00 – 12:20 **Break**

**Plenary session-2 (continue)** Chairman: Vyacheslav Meleshko

- 12:20 – 13:00 P4.2 Ziv Kizner (Israel) *Stability of hetonic quartets. Exploring transitions in baroclinic modons*

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13:00 – 13:40 P5.2 Shigeo Kida, Takeshi Watanabe & Takao Taya (Japan) *Unstable-periodic-flow analysis of Couette turbulence*

13:40 – 14:20 P6.2 GertJan van Heijst (The Netherlands) *Forced and decaying two-dimensional turbulence*

14:20 – 15:20 **Lunch**

**Plenary session-2 (continue)** Chairman: Hassan Aref

15:20 – 16:00 P7.2 George Zaslavsky (USA) *Nonintegrability and fractional kinetics along the filamented surfaces*

16:00 – 16:40 P8.2 Stephen Wiggins (UK) *High dimensional Hamiltonian dynamical systems: Theory and computational realization for theoretical chemistry*

16:40 – 17:00 **Break**

**Plenary session-2 (continue)** Chairman: Xavier Carton

17:00 – 17:40 P9.2 Nathan Paldor (Israel) *The validity of the nondivergence assumption in 2D vortex dynamics on the rotating earth*

17:40 – 18:20 P10.2 Valery Kozlov (Russia) *On Lagrangian turbulence*

**End of Plenary session-2**

**V. I. Yudovich Memorial Session** Chairman: Dmitry Treschev

18:20 – 19:20 Leonid Kurakin (Russia), Gérard Iooss (France),  
Vladimir Vladimirov (UK), Victor Berdichevsky (USA)

• **DAY 3: SUNDAY, 27 AUGUST**

10:00 – 14:00

**Excursion**

**Free time**

• **DAY 4: MONDAY, 28 AUGUST**

**Section *Problems of turbulence*** Chairman: Vladimir Zakharov

- 10:00 – 10:20 L1.4 Victor Berdichevsky (USA) *Statistical mechanics of vortex lines*
- 10:20 – 10:40 L2.4 Sergei Fedotov (UK) & Vicenç Méndez (Spain) *Hamilton-Jacobi equation and travelling waves involving anomalous transport and non-Markovian random processes*
- 10:40 – 11:00 L3.4 Rodion Stepanov (Russia) & Frank Plunian (France) *Magnetic field generation in fully developed turbulent flow*
- 11:00 – 11:20 L4.4 Vyacheslav Meleshko, Eugene Nikiforovich, Alexandre Gourjii (Ukraine) & Ronald Adrian (USA) *Dynamics of hairpin vortex packets in wall turbulence*
- 11:20 – 11:35 L5.4 Sergey Badulin (Russia), Alexander Babanin (Australia), Vladimir Zakharov (Russia, USA) & Don Resio (USA) *Weakly turbulent law of wind wave growth*
- 11:35 – 11:55 L6.4 Alexandr Vul'fson (Russia) *Distribution function for convective thermals in the atmospheric boundary layer*

**End of section *Problems of turbulence***

11:55 – 12:15

**Break**

**Section *Hamiltonian formalism and its applications***

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Chairman: Anatoly Neishtadt

- 12:15 – 12:35 L7.4 Bolotin Sergey (Russia) *Dynamics of skew products of symplectic maps*
- 12:35 – 12:55 L8.4 Jair Koiller (Brazil) & Kurt Ehlers (USA) *Rubber rolling: geometry and dynamics of 2-3-5 distributions*
- 12:55– 13:15 L9.4 Oksana Koltsova (Russia) *Homoclinic and periodic orbits in Hamiltonian systems with a saddle-center equilibrium*
- 13:15 – 13:35 L10.4 Victor Goncharov (Russia) & Vadim Pavlov (France) *Hamiltonian versions of contour dynamics*

**End of section *Hamiltonian formalism and its applications***

13:35 – 14:35 **Lunch**

**Section *Mathematical methods in the theory of vortices***

Chairman: Shigeo Kida

- 14:35 – 14:55 L11.4 Kevin O’Neil (USA) *Families of translating neutral vortex street configurations*
- 14:55 – 15:15 L12.4 Elena Milyute, Valentina Milyuvene & Algimantas Milyus (Lithuania) *Some questions of dynamics of substance in the spherical vortex*
- 15:15 – 15:35 L13.4 Oleg Bakunin (Russia) *Reconstruction of flow topology and percolation scalings*
- 15:35 – 15:55 L14.4 Ivan Mamaev, Alexey Borisov & Alexandr Kilin (Russia) *Transition to chaos in the dynamics of point vortices*
- 15:55 – 16:15 L15.4 Luca Zannetti (Italy) *Vortex equilibria in confined domains*

16:15 – 16:35 **Break**



**Section *Mathematical methods in the theory of vortices***

(**continue**) Chairman: Georgi Sutyrin

- 16:35 – 16:55 L16.4 Leonid Kurakin (Russia) *Point vortices in a circular domain: stability, resonances, and instability of stationary rotation of a regular vortex polygon*
- 16:55 – 17:15 L17.4 Lorena Barba (UK) & Oscar Velasco Fuentes (Mexico) *Lagrangian flow geometry of tripole vortex simulations*
- 17:15 – 17:30 L18.4 Tatyana Krasnopolskaya & Vyacheslav Meleshko (Ukraine) *Evaluation of petroleum patch transport in coastal zones by matrix method*
- 17:30 – 17:50 L19.4 Sherwin Maslowe & Nilima Nigam (Canada) *Vortex Kelvin modes with nonlinear critical layers*
- 17:50 – 18:10 L20.4 Banavara Shashikanth (USA) *Symmetric pairs of point vortices interacting with a neutrally buoyant 2D circular cylinder*

**End of section *Mathematical methods in the theory of vortices***

• **DAY 5: TUESDAY, 29 AUGUST**

**Section *Laboratory experiments*** Chairman: GertJan van Heijst

- 10:00 – 10:10 L1.5 Benjamin Cariteau & Jan-Bert Flór (France) *Cyclone interactions in a stratified rotating fluid*
- 10:10 – 10:20 L2.5 Estelle Guyez, Jan-Bert Flór & Emil Hopfinger (France) *Diapycnal mixing in Taylor-Couette flow*
- 10:20 – 10:40 L3.5 Sabine Décamp & Joël Sommeria (France) *Vortex generation by dense water overflow on a incline slope*
- 10:40 – 11:00 L4.5 XiLin Xie, WeiWei Ma & HuiLiang Zhou (China) *Spatial dynamics of some classical open shear flows*

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- 11:00 – 11:20 L5.5 Petr Denissenko (UK), Gregory Falkovich (Israel) &  
Sergei Lukaschuk (UK) *Clustering of floaters by waves*
- 11:20 – 11:40 L6.5 Efim Kudashev (Russia) *Resolution on near-wall pressure in  
turbulence on the basis of functional approach*
- 11:40 – 12:00 L7.5 Valery Okulov, Igor Naumov (Russia), Wen Zhong Shen &  
Jens Nørkær Sørensen (Denmark) *Triplet of helical vortices*
- End of section *Laboratory experiments***
- 12:00 – 12:20 **Break**
- Section *Stability and bifurcation* Chairman: Denis Blackmore**
- 12:20 – 12:40 L8.5 Alexandr Batkhin & Natalia Batkhina (Russia) *Cascades of period  
multiplying in planar Hill's problem*
- 12:40 – 13:00 L9.5 Andrei Il'ichev & Georgy Tsyppkin (Russia) *Transition to instability  
and reversible bifurcations of flows with phase transition in  
horizontally extended domains of a porous medium*
- 13:00 – 13:20 L10.5 Igor Bakholdin (Russia) *Shocks with regular and stochastic structures  
in non-dissipative and low-dissipative dispersive systems*
- 13:20 – 13:35 L11.5 Aleksandr Shvets & Tatyana Krasnopolskaya (Ukraine) *Hyper-chaos  
in piezoceramic systems with limited power-supply*
- End of section *Stability and bifurcation***
- 13:35 – 14:35 **Lunch**
- Section *Computer-assisted methods in studying dynamical systems*  
Chairman: Alexey Borisov**
- 14:35 – 14:55 L12.5 Roman Shamin (Russia) *About solvability and numerical simulation of  
nonstationary flow of ideal fluid with a free boundary*

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- 14:55 – 15:15 L13.5 Konstantin Volosov (Russia) *New method of construction of solutions of the quasilinear parabolic equations in the parametrical form*
- End of section *Computer-assisted methods in studying dynamical systems***
- Section *Theory of integrability* Chairman: G rard Iooss**
- 15:15 – 15:35 L14.5 Denis Blackmore (USA) *Non-integrable perturbations of the dynamics of two point vortices*
- 15:35 – 15:55 L15.5 Sergey Suetin (Russia) *On an integrable system and spectral properties of some class of discrete Sturm-Liouville operators*
- 15:55 – 16:15 L16.5 Natalia Denisova (Russia) *Steady viscous flows and tensor invariants of dynamical systems*
- End of section *Theory of integrability***
- 16:15 – 16:35 **Break**
- Section *Problems of geophysical hydrodynamics***
- Chairman: Chantal Staquet
- 16:35 – 16:55 L17.5 Achim Wirth & Jacques Verron (France) *Non-traditional eddy dynamics*
- 16:55 – 17:15 L18.5 Peter Jan van Leeuwen (The Netherlands) *The propagation of stratified monopoles on a sphere*
- 17:15 – 17:35 L19.5 Alan Hinds, Ted Johnson & Robb McDonald (UK) *Beach zone vortices near stepped topography*
- 17:35 – 17:55 L20.5 Philippe Caillol & Roger Grimshaw (UK) *Rossby solitary waves in the presence of a critical layer*
- 17:55 – 18:15 L21.5 Sergei Medvedev (Russia) & Vladimir Zeitlin (France) *Weak turbulence of short equatorial waves*

• **DAY 6: WEDNESDAY, 30 AUGUST**

**Section *Problems of geophysical hydrodynamics***

Chairman: Gregory Reznik

- 10:00 – 10:20 L1.6 Chantal Staquet (France) *Interaction of inertia-gravity waves with a baroclinic shear flow*
- 10:20 – 10:40 L2.6 Maxim Budyansky, Mikhail Uleysky & Sergey Prants (Russia)  
*Fractal advection of passive scalar in a wavy jet*
- 10:40 – 10:50 L3.6 Georgi Sutyrin (USA) *Inertial pulsations of lens-like stratified anticyclonic vortices*
- 10:50 – 11:00 L4.6 Georgi Sutyrin (USA) & Xavier Carton (France) *Evolution of an intense baroclinic vortex in a sheared flow*
- 11:00 – 11:20 L5.6 Xavier Carton & Xavier Perrot (France) *Vortex interaction in an unsteady large-scale shear/strain flow*
- 11:20 – 11:40 L6.6 Kirill Karelsky & Arakel Petrosyan (Russia) *Modified shallow water equations. Simple waves and Riemann problem*
- 11:40 – 12:00 L7.6 Konstantin Koshel, Dmitry Stepanov & Yury Izrail'sky (Russia)  
*Estimation of optimal for chaotic transport frequency of nonstationary flow oscillation*

12:00 – 12:20

**Break**

**Section *Problems of geophysical hydrodynamics* (continue)**

Chairman: Jan-Bert Flór

- 12:20 – 12:40 L8.6 Andrey Sigalov & Nathan Paldor (Israel) *The unified theory of linear shallow water equation on the rotating plane*
- 12:40 – 12:55 L9.6 Dmitrii Cherniy, Vyacheslav Meleshko, Stanislav Dovgii (Ukraine)

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*Topological aspects of the vortex structure of tornado*

12:55 – 13:15 L10.6 Oleg Derzho (Russia) *A theory for internal gravitational waves with trapped recirculation core in deep fluids*

13:15 – 13:35 L11.6 Ilya Kostin & Grigory Panasenko (France) *Khokhlov-Zabolotskaya-Kuznetsov type equation: in heterogeneous media*

13:35 – 14:35

**Lunch**

**Section *Problems of geophysical hydrodynamics* (continue)**

Chairman: Ziv Kizner

14:35 – 14:55 L12.6 Sergei Muzylev (Russia) *Effect of an ice cover on edge waves*

14:55 – 15:15 L13.6 Valery Zyryanov (Russia) *On the stability of stratified quasigeostrophic currents with vertical shear*

15:15 – 15:25 L14.6 Peter Davies (UK), Konstantin Koshel & Mikhail Sokolovskiy (Russia) *Chaotic advection and nonlinear resonances in a periodic flow above submerged obstacle*

15:25 – 15:35 L15.6 Mikhail Sokolovskiy (Russia) & Jacques Verron (France) *Motion of  $N+1$  vortices in a two-layer rotating fluid*

15:35 – 17:00

**Closing ceremony. Coffee-Tea**