Fluctuating Fields in Stochastic Models of Turbulence.

Richard Remecky
remecky@saske.sk

Institute of Experimental Physics, SAS, Košice

COLLOQUIUM
Department of Theoretical Physics
Institute of Experimental Physics, SAS, Košice
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Outline

The Dissertation Thesis

List of Publications

Accepted Publications

List of Internships

List of Presentations

Accepted Presentations

Stochastic dynamics, Quantum field theory, Renormalization group

- ▶ Stochastic dynamics defined by stochastic equation and correlator of a random force
- ▶ Stochastic model is equivalent to quantum field theory with an action functional
- ▶ Analysis of the stochastic model by renormalization group approach
- ▶ Interest: Kolmogorov regime, IR stability, UV fixed points, structure functions and constants of the model (Kolmogorov constant, Prandtl number etc.)

Influence of Helicity on the Kolmogorov Regime in Fully Developed Turbulence

Published in *PHYSICAL REVIEW E 79, 046319 (2009)*

- ▶ The investigation of the stability of the Kolmogorov scaling regime in the model of fully developed turbulence
- ▶ The model of fully developed turbulence was described by the stochastic Navier-Stokes equation with self-similar Gaussian random stirring force δ-correlated in time and with correlator proportional to $k^{4-d-2\varepsilon}$
- ▶ The spatial parity violation, helical system
- ▶ The analysis of the model in space dimension $d = 3$ due to the Levi-Civita tensor of rank 3
- ▶ The two-loop approximation

Anomalous Scaling of Passive Vector Advection

Published in *J. Phys. A: Math. Theor. 42, 275501 (2009)*

- ▶ The advection of the passive vector field (a weak magnetic field in the framework of the kinematic MHD)
- ▶ The turbulent system driven by the stochastic Navier-Stokes equation
- ▶ The isotropic case, as well as the large-scale anisotropic case
- ▶ The one-loop approximation
- ▶ The comparison to models of a passive scalar and vector field advection driven by a "synthetic" Gaussian velocity fields

Passive Scalar Advection Under the Influence of Anisotropy

Published in *PHYSICAL REVIEW E 80, 046302 (2009)*

- ▶ The passive scalar advection
- ▶ The fully developed turbulence governed by the stochastic Navier-Stokes equation
- ▶ The investigation of the influence of weak uniaxial small-scale anisotropy on the stability of the scaling regimes
- ▶ The one-loop approximation
- ▶ The stability of the three dimensional Kolmogorov-like scaling regime is demonstrated
- ▶ The dependence of the turbulent Prandtl number on the anisotropy parameters is studied

Calculation of Turbulent Prandtl Number in Two-loop Approximation

Published in *PHYSICAL REVIEW E 82, 028301 (2010)*

- ▶ The advection of the passive scalar field
- ▶ The statistics of the velocity field is given by the stochastic Navier-Stokes equation
- ▶ The two-loop approximation
- ▶ The revision of the numerical value of the turbulent Prandtl number
- ▶ The final value in the two-loop approximation is $Pr_t = 0.7051$

Publications

- **E. Jurčišinová, M. Jurčišin, R. Remecký and M. Scholtz,** Physics of Particles and Nuclei Letters, Vol. 5, No. 3, 219-222 (2008).

- **E. Jurčišinová, M. Jurčišin, R. Remecký and M. Scholtz,** International Journal of Modern Physics B, Vol. 22, No. 21, 3589-3617 (2008).

- **E. Jurčišinová, M. Jurčišin, R. Remecký,** J. Phys. A: Math. Theor. 42, 275501 (2009).

- **E. Jurčišinová, M. Jurčišin, R. Remecký,** Phys. Rev. E 79, 046319 (2009).

- **E. Jurčišinová, M. Jurčišin, R. Remecký,** Phys. Rev. E 80, 046302 (2009).

Publications

- **J. Buša, E. A. Hayryan, E. Jurčišinová, M. Jurčišin, R. Remecký,** Bulletin of PFUR, No 4. (2009).

- **E. Jurčišinová, M. Jurčišin, R. Remecký,** Phys. Rev. E 82, 028301 (2010).

- **A. V. Gladyshev, E. Jurčišinová, M. Jurčišin, and R. Remecký,** Physics of Particles and Nuclei, Vol. 41, No. 7, pp. 10231026, (2010).

Accepted Publications

▶ **E. Jurčišinová, M. Jurčišin, R. Remecký,** "Influence of Helicity on the Turbulent Prandtl Number: Two-Loop Approximation", Theoretical and Mathematical Physics, (2011).

Internships

- ▶ JOINT INSTITUTE FOR NUCLEAR RESEARCH, Dubna, Russian Federation, Bogoliubov Laboratory of Theoretical Physics, July - October 2005
- ▶ JINR, Dubna, Russian Federation, BLTP, June - September 2008
- ▶ JINR, Dubna, Russian Federation, BLTP, May - August 2009
- ▶ JINR, Dubna, Russian Federation, BLTP, August - November 2010
- ▶ JINR, Dubna, Russian Federation, BLTP, March - June 2011

Conferences

- **8th SMALL TRIANGLE MEETING on Theoretical Physics,** Herľany, Slovakia, September 17 - 20, 2006
- **Renormalization Group and Related Topics,** Dubna, Russia, September 1 - 5, 2008
- **7th PAMIR International Conference on Fundamental and Applied MHD,** Presqu'île de Giens, France, September 8 - 12, 2008
- **10th SMALL TRIANGLE MEETING on Theoretical Physics,** Medzilaborce, Slovakia, September 21 - 24, 2008
- **Mathematical Modeling and Computational Physics,** Dubna, Russia, July 7 - 11, 2009

Conferences

- **12th EUROMECH European Turbulence Conference,** Marburg, Germany, September 7 - 10, 2009
- **6th International Symposium on Turbulence, Heat and Mass Transfer,** Rome, Italy, September 14 - 18, 2009
- **11th SMALL TRIANGLE MEETING on Theoretical Physics,** Kysak, Slovakia, September 20 - 23, 2009
- **The 6th International Conference: Dynamical Systems and Applications,** Antalya, Turkey, July 10 - 14, 2010
- **Models in Quantum Field Theory,** Peterhof, October 18 - 22, 2010

Accepted Presentations

- **8th PAMIR International Conference on Fundamental and Applied MHD,** Borgo Corsica, France, September 5 - 9, 2011
- **12th EUROMECH European Turbulence Conference,** Warsaw, Poland, September 12 - 15, 2011