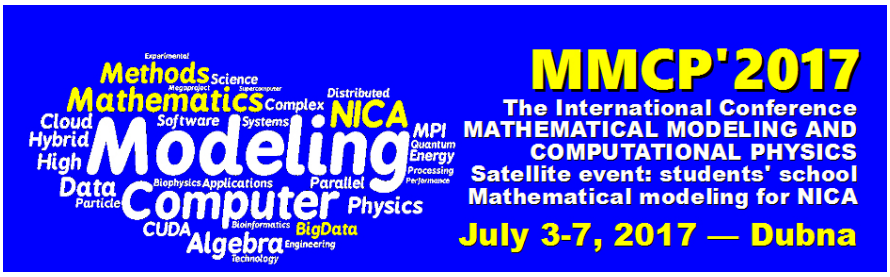

Contribution ID: **158** Type: **not specified**

Diffusion processes in A model of vector admixture: Turbulent Prandtl number

Tuesday, 4 July 2017 14:30 (15 minutes)

One of the most important characteristics of diffusion processes in fluids is the Prandtl number as a ratio of the coefficient of kinematic viscosity to the coefficient of the corresponding diffusivity. The numerical values of various Prandtl numbers, in general, depend on the microscopic structure of the fluids at low Reynolds numbers. The situation changes when the Reynolds numbers obtain very high values, i.e., in the so-called fully developed turbulence regime. Here, the Prandtl numbers obtain universal values which are known as "effective"or "turbulent"Prandtl numbers. Recently, the turbulent Prandtl numbers were studied in various models of passive admixtures (scalar or vector) in fully developed turbulence given by the stochastic Navier-Stokes equation using the field theoretic renormalization group technique in the second order of the perturbative expansion (two-loop approximation) [1,2,3,4].

In the present work the behavior of the turbulent vector Prandtl number is investigated as the function of the spatial dimension d > 2 in the framework of the general A model of passively advected vector field, where three important and physically interesting cases, namely, kinematic MHD (A = 1), linearized Navier-Stokes equation (A = -1) and admixture of a vector impurity by the N-S turbulent flow (A = 0), are included. The behavior of the turbulent Prandtl number is studied in the model with the Navier-Stokes fully developed turbulence. Using the field theoretic renormalization group approach in the two-loop approximation we analyzed the dependence of the turbulent vector Prandtl number on the parameter A as well as on the spatial dimension d. For detailed analysis and results see [5].

Short biography note

[1] L. Ts. Adzhemyan, J. Honkonen, T. L. Kim, and L. Sladkoff, Phys. Rev. E 71, 056311 (2005)
[2] E. Jurcisinova, M. Jurcisin, R. Remecky, Phys. Rev. E 82, 028301 (2010)
[3] E. Jurcisinova, M. Jurcisin, R. Remecky, Phys. Rev. E 84, 046311 (2011)
[4] E. Jurcisinova, M. Jurcisin, R. Remecky, Phys. Rev. E 88, 011002 (2013)
[5] E. Jurcisinova, M. Jurcisin, R. Remecky, Phys. Rev. E 93, 033106 (2016)

Primary author: Dr REMECKY, Richard (BLTP JINR, Dubna)

Co-authors: Dr JURČIŠINOVÁ, Eva (Institute of Experimental Physics, SAS, Košice, Slovakia); Dr JURČIŠIN, Marian (Institute of Experimental Physics, SAS, Košice, Slovakia)

Presenter: Dr REMECKY, Richard (BLTP JINR, Dubna)

Session Classification: Mathematical methods and application software for modeling complex systems and engineering (II)