



Dr. Dušan Jovanović – Biography

Full member since 2016.

Basic information. Dr. Dušan Jovanović was born on August 10, 1950 in Belgrade, where he still lives. He finished elementary school and high school in Belgrade with the highest success and awards. He graduated in 1974 from the Faculty of Electrical Engineering in Belgrade, majoring in Technical Physics. He received his magisterial degree in 1978 at the Faculty of Electrical Engineering in Belgrade, majoring in Physics of Ionized Gases. He received his doctorate in 1984 at the Faculty of Physics in Belgrade. In 1975, he got a job at the Faculty of Electrical Engineering as an assistant-trainee, and from 1977 he worked continuously at the Institute of Physics in Belgrade, first as a research assistant, from 1985 as a research associate, in 1990 as a senior research associate and in 1996 he was elected to the position of scientific advisor/research professor. He was a professor at the doctoral studies of the Faculty of Physics in Belgrade and the Faculty of Science and Mathematics in Kragujevac on subjects in the fields of plasma theory and nonlinear optics. After retiring from the Institute of Physics in 2017, he worked until 2020 as a full professor at the State University in Novi Pazar where he taught four undergraduate courses. He was a member of the European Physical Society and the Physical Society of Serbia. He holds the rank of reserve officer. He speaks English fluently and uses Russian and Italian. He is married, has two children and four grandchildren.

International engagement. Part of the research for his doctoral dissertation was carried out at the Risø National Laboratory in Denmark (1980-81). He did her postdoctoral training at Risø (1984) and at the University of California, Los Angeles (1984-87). He was an Associate Member (1991–2000) and Senior Associate Member (2002–11) at the Abdus Salam International Centre for Theoretical Physics in Trieste, Italy and a member of the Dusty Plasma Team (2000–2002), International Space Science Institute in Bern, Switzerland. He has worked as a visiting scientist and visiting professor at many European and North American universities and institutes, including the Ruhr University, Bochum (26 months during 1999-2009), University Bayreuth (23 months 2002), University Torino (3 months 1996-97), University of Naples (18 months 2005-2019), University of Pisa (15 months 1997-2004), University of California, Santa Barbara (March 1995), Institute of Fusion Studies, University of Texas at Austin (7 months 1992-95), University of California Los Angeles (9 months 1987), Risø National Laboratory Denmark (5 months 1988-91), University of Orleans (2 months 2008-09), Texas A&M University, Qatar (24 months 2014-23). In addition, he held seminars and lectures by invitation at the ENEA laboratory in Frascati, the FOM Institute in Utrecht, Umeå and Chalmers universities in Sweden, University Dusseldorf in Germany, University California, Santa Barbara, USA.

Scientific research topics. Basic research in theoretical plasma physics. Nonlinear theory of coherent structures in magnetized plasma with realistic configurations, including gyrokinetic effects, interaction with high frequency waves, effects of curvature, inhomogeneities of density, magnetic field and plasma flows. Stability of coherent structures, their mutual interaction and role in the anomalous transport. Magnetic reconnection. Problems in magnetically confined thermonuclear fusion. Turbulence of drift waves and ion temperature gradient driven waves in realistic tokamak geometry, including renormalization and

anomalous transport. Nonlinear effects in the magnetosphere of the Earth, other planets of the solar system, in the solar wind and magnetic tails of comets. Strong turbulence in the plasma of the Earth's magnetosphere and of the solar wind. Magnetic reconnection supported by ion and electron kinetic structures (holes). Dusty plasma. Quantum plasma. Physics of the Bose-Einstein condensate. Optical solitons. Self-organization in magnetized plasma, solitons, two- and three-dimensional coherent structures and their stability. Interaction of ultrashort-ultrastrong electromagnetic pulses with plasma and other materials. Interaction of dense relativistic particle beams with plasma. Production of relativistic beams of elementary particles in a new generation of accelerators based on the nonlinear interaction of laser beams with plasma and their use for the excitation of laser beams in the X-ray frequency range. Research methods include analytical problem modeling and numerical solution of nonlinear partial differential equations.

Scientific results: He has published 117 articles in international journals from the SCI list, 2 articles in domestic journals, gave 36 invited lectures and 70 contributions at international conferences, and 4 chapters in books.

Response to Research Results: According to the Google Scholar service, the works of Dušan Jovanović were cited 1064 times with an h-index of 17 and an i10-index of 34.

Pedagogical activities: Supervised two magisterial theses and four doctoral dissertations. Taught doctoral courses in Fusion Plasma Physics at the Faculty of Physics in Belgrade and Nonlinear Optics at the Faculty of Science in Kragujevac, and various undergraduate physics courses at the University California, Los Angeles and at State University of Novi Pazar.

Organizational work: Principal investigator/manager of the projects of the Ministry of Science, Technology and Development of the Republic of Serbia "Nonlinear dynamic phenomena in photorefractive media, liquid crystals, plasma and double negative materials" (2006-2010) and "Nonlinear dynamics of localized self-organized structures in plasma, nano-composite materials, liquid and photonic crystals and ultracold condensates" (2011-2017), task A12 of the Yugoslav project NG-112 "Research of controlled thermonuclear fusion" (1989-90), Yugoslavia-USA project "Vortices and anomalous transport in magnetically maintained plasma" (1990-1993), the Serbian-French project from the Pavle Savić program "Research of waves in front of the Earth's arc shock" (2008-2009) and more than 10 individual projects at the German academic foundation DAAD. Was in the scientific committee of 8 international conferences.

Contribution to nonlinear sciences: Dr. Dušan Jovanović devoted his entire scientific work to research in nonlinear sciences. His contribution to the theory of self-organization of vortex and kinetic structures in magnetized plasma is particularly important, with the application of his results to controlled fusion in a tokamak and to plasma turbulence within the solar system.

List of five selected papers

1. D. Jovanović, O. Alexandrova, M. Maksimović, and M. Belić, *Fluid theory of coherent magnetic vortices in high- β space plasmas*, *Astrophysical Journal* 896:8.1-18 (2020).
2. D. Jovanović, G. Fiore, and U. de Angelis, *A self-consistent picture for hyper-velocity metal dust in FTU*, *Nuclear Fusion* **53**, 033008.1-6 (2013).
3. D. Jovanović and P. K. Shukla, *Solitary waves in the Earth's magnetosphere: nonlinear stage in the lower-hybrid Buneman instability*, *Geophys. Res. Lett.* **31**, L05805-9 (2004).
4. D. Jovanović and P. K. Shukla, *Guiding center theory for ion holes in magnetized plasmas*

Phys. Rev. Lett. **90**, 135001.1-4 (2003).

5. D. Jovanović and P. K. Shukla, *Nonlinear Model for coherent electric field structures in the magnetosphere*, Phys. Rev. Lett. **84**, 4373-4376 (2000).