



SLOBODAN VUKOVIĆ

Born on January 4, 1947 in Niš, from father Momčilo and mother Bosanka. Attended primary school and gymnasium in Belgrade. Received his B.Sc. degree in Astronomy-Astrophysics at Faculty of Sciences, University of Belgrade (1969) At the same faculty he received M.Sc. degree in Physics (1971) and defended his Ph.D. thesis (1974) entitled *Theory of surface wave fluctuations in inhomogeneous plasma* at the Department of Physics. Immediately after receiving his B.Sc. in 1969 he was employed in the Institute of Physics, University of Belgrade where he worked, with several short and long leaves, till the end of 2011. During that period, he passed all the way from young research assistant to the position of Research Professor (1991). At the end of his career, he got a position at the Institute of Chemistry, Technology and Metallurgy (IHTM), University of Belgrade where he worked till retirement in 2014. In the years 1972-1973 he

worked at the Physical Institute of USSR Academy of Sciences "P.N. Lebedev" (FIAN) in Moscow. During the period 1984-1990 he was employed as *Research Fellow* at the Australian National University (ANU) in Canberra. Also, it is worth mentioning his activity from 2010 till 2019 as a casual investigator (2-3 months per year) at National Priority Research Projects of the Qatar Foundation within the Texas A&M University in Doha, Qatar. He fluently speaks English and Russian, but limited proficiency in Spanish. He was elected a corresponding member of Serbian Academy of Nonlinear Sciences on April 25, 2019.

Research Interests: His research field of interest before this millennium was *Theoretical Plasma Physics*, and in particular

- Transport processes in a plasma of intermediate degree of ionization.
- Surface waves and fluctuations in plasmas.
- Absorption of radiation layered opaque media.
- Ponderomotive forces and nonlinear magnetic field generation in plasmas.

During the last 20 years his research interest are optical properties of layered media, and in particular

- High transparency of classically opaque metallic films.
- Nonlinear waves in optical waveguides and fibers.
- Reflection and transmission of radiation in materials with negative refraction.
- Nano-optics and nano-photonics, plasmonics and photonic crystals.
- Hyperbolic metamaterials and metasurfaces.

Scientific results: Up to the end of 2020 he published around 80 articles in international scientific journals, around 50 of which in the leading peer reviewed ones. As an editor he published a book *Surface Waves in Plasmas and Solids*, World Scientific, Singapore 1986. Also, he published two chapters in the other books. Also, it is necessary to acknowledge his

international conference activities, with around 20 keynote and invited lectures given at renowned conferences and published in the proceedings.

Response to Research Results: According to the service *Google Scholar Citation* his works have been cited 1047 times in the world scientific literature, of which 483 times in the last 5 years. He was a member of scientific and organizing committees of international conferences. He has been a reviewer for several renowned journals as: *Journal of Optical Society of America*, *Optics Letters*, *Physical Review A*, *Optics Communications*, *Physics of Fluids*, *Journal of Nanophotonics*, etc.

Educational activities: His pedagogical activities were carried out at several Universities within the Republic of Serbia, both on undergraduate and graduate level. At the beginning he was teaching assistant on Theoretical Mechanics and Plasma Physics (Faculty of Sciences, Belgrade, 1970-1972). After that, as Assistant Professor he gave lectures on "Electromagnetism and Optics" (Faculty of Sciences, University 1976-1978). On the Faculty of Philosophy, University of Nis he lectured Theoretical Physics (1979-1983), and on the Faculty of Technology in Leskovac he lectured General Physics (1981-1983). He was promoted to Associate Professor at the University of Nis in 1982. At the same University he has been promoted to Professor of Physics in 1992, where he lectured Electrodynamics till 1998. At the Faculty of Physics, University of Belgrade he lectured Theoretical Plasma Physics, as well as Physical Kinetics in the period 2002-2006. At the graduate studies on the same Faculty, he lectured Plasma Kinetic Theory I and II within the department of Physics of Ionized gases and plasmas. He was mentor of 2 Ph.D. thesis (Dr. Dušan Jovanović and Dr. Najdan Aleksić, who are now the members of Serbian Academy of Nonlinear Sciences), as well as mentor of several M.Sc. thesis and diploma works.

Organizational: Dr. Vuković organized numerous scientific conferences, both on the national and international level. Also, he established scientific cooperation with USSR (Russia, Ukraine, Georgia), Australia, Spain, Qatar, and other countries. He held several positions of high responsibility in the Institute of Physics, Belgrade, as well as in other institutions of the Republic of Serbia. Among others, he was the member of the Institute of Physics board (8 years), member of the board in Vinča Institute for nuclear sciences (4 years), as well as the chair of the board of Astronomical Observatory in Belgrade (4 years).

Contribution to Nonlinear Sciences:

- By using two totally independent physical methods, an identical analytical expression for the ponderomotive force density of high-frequency radiation in a dispersive media has been obtained. Especially important in the case of magnetoactive plasma.
- The First integral of the complete set of Maxwell's equations coupled by Kerr-type nonlinearities has been found. It is demonstrated that polarization of the surface waves can be hybrid (TE-TM), and strongly controlled by the incident radiation power flux.
- Propagation of surface waves along the boundary of semi-infinite layered plasmonic metamaterial cut normally to the layers has been investigated. Then, in some spectral regions, hyperbolic dispersion can take place that leads to strong confinement of the field along the surface, and hybridization of polarization (TE-TM). Dyakonov equations have been solved numerically, and the existence of obliquely propagating surface waves demonstrated.

A List of 5 Selected Research Publications:

1. S. Vukovic: „Ponderomotive Force of a High-frequency Electromagnetic Field in a Dispersive Plasma“, *Laser and Particle Beams* **2**, 293 (1984).
2. S. Vukovic and R. Dragila: „Hybrid TE-TM Nonlinear Guided Waves“, *Optics Letters* **14**, 529 (1989).

3. Z. Jakšić, S. Vuković, J. Matović, D. Tanasković, "Negative Refractive Index Metasurfaces for Enhanced Biosensing", *Materials*, **4**, 1 (2011).
4. C. J. Zapata-Rodriguez, S. Vukovic, J. J. Miret and M. R. Belic: „Engineered Surface Waves in Hyperbolic Metamaterials“, *Optics Express* **21**, 19113 (2013).
5. C. J. Zapata-Rodriguez, S. Vukovic, J. J. Miret, M. Naserpour and M. R. Belic: „Dyakonov Surface Waves: Anisotropy Enabling Confinement on the Edge“, Chapter 3 in the Book *Surface Waves: New Trends and Development* , IntechOpen (2018).