**Albert Samoilenka**

**Personal details**

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**Education**

Belarusian State University, The Faculty of Physics, Minsk, Belarus, Graduated with summa cum laude, 5-year "Physicist" diploma (equivalent to Master degree)

KTH Royal Institute of Technology, Stockholm, Sweden, PhD student

**Skills**

Languages: Russian (native), Belarusian (native), English (fluent).

Software: C++, C#, Cuda, JavaScript, Unity3D, Delphi, Mathematica, LaTeX, FreeFem, Mayavi.

Systems: LINUX, MS Windows, macOS, Android.

**Research summary**

Main research area of my studies is related with Mathematical Physics, Numerical Methods in Field Theory, Topological Solitons and their applications in condensed matter physics and High energy physics. I have studied numerically and analytical various problems of Nonlinear Physics.

In 2015-2017 I studied gauged planar Skyrmions with and without Chern-Simons term (results were published in two papers in PRD [1,2]), we showed that coupling to the magnetic field strongly affects the pattern of interaction between the constituents. Next, we constructed fractional Hopfions in Faddeev-Skyrme model and introduced new position curve for them (published in JHEP [2], conference proceedings [3]). Recently, we have found new class of regular soliton solutions of the gauged planar Skyrme model with fractional topological charges and finite energy -- gauged merons, we also found a new relation between the quantization of the magnetic flux of the solitons and the Poincare index of gauged components of the scalar field (published in PRD [5]). We have finished another work on Hopfions [6] in gauged Faddeev-Skyrme model, where we have implement ideas from [5] to show that magnetic flux on zeros of gauged components of the scalar field becomes quantized. Another direction of my work is related with study of the gauged domain walls on a cylinder and construction of the bound for Hopfions in frustrated magnets.

I want to highlight that apart from analytical studies, which were closely connected to the topology, all above mentioned works I studied numerically. Simulated annealing algorithm served as a basis for my algorithm of numerical minimization of the energy functional, which I wrote on C++. When considering different models I adapted my algorithm accordingly, so that now it can successfully find solutions in 1, 2 or 3 dimensional models with more than $200^3$ grid points and 5 fields in the last case. Also I modified it so that it's possible to find saddle points for non-positively defined functionals. It was successfully used for 2-d baby Skyrmions, Hopfins and 3-d Skyrmions.

**Awards**

- First Prize of Special Funds of the President of the Republic of Belarus for XIX Republic Young Physicists' Tournament, 2011

- Second Prize of Special Funds of the President of the Republic of Belarus for XX Republic Young Physicists' Tournament, 2012

- Gold medal on Belarusian Physics Olympiad, Belarus, 2012

- **Gold medal on 43rd International Physics Olympiad (IPhO), Estonia 2012**

- First Prize of Special Funds of the President of the Republic of Belarus for 43rd IPhO with Delivery of the Breastplate of the Laureate

- **Enlisted in the fund of talented youth of Republic of Belarus, 2012**

- **Silver medal on 2nd World Physics Olympiad (WoPhO), Indonesia 2012**

- Gold medal on Xth International Engineering Mechanics Contest, Belarus, 2014

- Prize of Special Funds of the President of the Republic of Belarus for Xth International Engineering Mechanics Contest, 2014

- Silver medal on XIth International Engineering Mechanics Contest, Belarus 2015

- **2nd place on JINR Youth Prize Competition of The XX International Scientific Conference of Young Scientists and Specialists, Dubna 2016**

- 1st place in 3 Minute Thesis competition, Belarus-Ivanovo-Karaganda 2017

- 1st category on the Republican competition of scientific works of students, Minsk, Belarus, 2017.

- **Research grant (2514 BYN) “Numerical methods for solutions of problems in field theory” from Ministry of education at BSU, Minsk, 2018**

**Publications**

[1] Samoilenka, A. Gauged multisoliton baby skyrme model / A. Samoilenka, Ya. Shnir //

Physical Review D. ”— 2016. ”— Vol. 93. ”— P. 065018. ”— arXiv:1512.06280.

[2] Samoilenka, A. Gauged baby skyrme model with a chern-simons term / A. Samoilenka,

Ya. Shnir // Physical Review D. ”— 2017. ”— Feb. ”— Vol. 95. ”— P. 045002. ”—

arXiv:1610.01300.

[3] Samoilenka, A. Fractional hopfions in the faddeev-skyrme model with a symmetry

breaking potential / A. Samoilenka, Ya. Shnir // Journal of High Energy Physics. ”—

2017. ”— Vol. 2017. ”— P. 29. ”— arXiv:1707.06608.

[4] Samoilenka, A. Multisoliton solutions of models of the skyrme family /

A. Samoilenka // Conference materials, Collection of works of the 74th scientific

conference of students and post-graduate students of the BSU. ”— 2017.

[5] Samoilenka, A. Gauged merons / A. Samoilenka, Ya. Shnir // Phys. Rev. D. ”— 2018.

”— Feb. ”— Vol. 97. ”— P. 045004. ”— <https://link.aps.org/doi/10.1103/>

PhysRevD.97.045004.

[6] Samoilenka, A. Magnetic hopfions in the faddeev-skyrme-maxwell model /

A. Samoilenka, Ya. Shnir // Phys. Rev. D. ”— 2018. ”— Jun. ”— Vol. 97. ”—

P. 125014. ”— https://link.aps.org/doi/10.1103/PhysRevD.97.125014.