CV OF Oleg Angelsky

Name: Oleg V. Angelsky
Date of birth: 1957, 5 of May
Position: Director, Correlation Optics Department
Employer: Chernivtsi University, Ukraine
Business address:
Correlation Optics Dpt, Chernivtsi University 2, Kotsyubinsky St.
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PROFESSIONAL RECOGNITION HONORS

Fellow, Institute of Physics (UK) (1999, 2004)
Fellow, SPIE (2001)
Fellow of OSA (2003)
Fellow of EOS (2014)
Member, Academy of Science of Universities of Ukraine (1997)
Recipient, Medal of Rozhdestvensky Russian Optical Society", Russia (1995)
Recipient, "Medal of Yaroslav Mudry" of the Academy of Science of Universities of Ukraine (1998)
Recipient of the title of Honoured Worker of Science and Engineering of Ukraine (2003).
Recipient of the Galileo Galilei Award for 2007
Honorary Diploma of the Prime Minister of Ukraine, 2015

FIELD OF STUDY

Optics

DATES ATTENDED & DEGREES AWARDED :

1979 - MSc Diploma (GII N 044203)
1983 - PhD Diploma (FM N 017868)
1990 - Dr of Science Diploma (DT N 006493)
1991 - Full Professor Diploma (PR N 010275)

AREAS OF PROFESSIONAL SPECIALIZATION

Rough Surfaces Characterization; Fractal Optics;
Holography; Singular Optics

SPECIFIC OPTICAL SCIENCE AND ENGINEERING PROFESSIONAL ACCOMPLISHMENTS

Over 300 publications in optical sciences, more than 200 in refereed archival journals. Co-author of 7 monographs.

PRINCIPAL RESEARCH ACCOMPLISHMENTS:

1. Developed method of holographic measurement of dynamic and structural characteristics of quasi-spherical Brownian particle ensembles.
2. Developed practical interference correlometry methods for characterization of rough surfaces. Method has sensitivity threshold in the tens of Angstroms.
3. Application of fractal geometry and fractal optics, along with fast polarization-interference methods, to rough surface diagnostics.
4. Investigation of referenceless holographic recording methods for fractal analysis.
5. Introduction of new approach for analysis of singularities (e.g., phase-difference vortices) in vector fields. Included in this work is the formulation of the sign principle for phase-difference vortices and the elaboration of an inteferometric technique for the analysis of s-contours and C-points in vector optical fields.

6. It is shown that the result of colouring of the beam at the output of the scattering medium depends on the magnitudes of the phase delays of the singly forward scattered partial signals. The colouring mechanism has for the first time experimentally been illustrated for a forward propagating beam through a light-scattering medium. Spectral investigation of the effects of colouring has been carried out using a solution of liquid crystal in a polymer matrix. The amplitude ratio of the non-scattered and the singly forward scattered interfering components significantly affects the colour intensity. It has further been established that the spectral content of the illuminating beam strongly influences the colour of the resulting radiation.

PRINCIPAL PROFESSIONAL SOCIETY MEMBERSHIPS AND ACTIVITIES

Fellow, Institute of Physics (UK)
Fellow, SPIE
Fellow, OSA
Fellow, EOS
Member, Academy of Science of Universities of Ukraine
Member, Governing Board of SPIE-Ukraine (1996-2007).
Founder and Chair, Ukrainian Territorial Board of the ICO (responsible for arranging conferences, distributing information, organizing participation by Ukrainian scientists in international conferences and congresses of ICO in Germany, Hungary, Korea, and the USA (1990, 1993, 1996, 1999).
Member, Advisory Committee of EOS (European Optical Society) 1996-1998 and 2009-now.
Vice-President of Ukrainian Optical Society (1996-2002).
President of Society “Pure and Applied Optics” (since 2009).

OTHER NOTEWORTHY ACCOMPLISHMENTS IN SCIENCE, ENGINEERING, AND PUBLIC SERVICE

1. Chair of the International Conferences "Holography, Correlation Optics and Recording Materials", "Correlation Optics" held in Chernivtsi in 1993, 1995, 1997, 1999, 2001, 2003, 2005,
2. 2007, 2009, 2011, 2013 under the aegis of SPIE, ICO, and EOS. Scientists from 32 countries took part in these conferences.
3. Chair of the Organising Committee of the International Conference "Laser Application" held in Chernivtsi in 1991.
4. Guest Editor of the special issue of "Optical Engineering" April, V. 34, No. 4, 1995, titled as "Optics in Ukraine" (USA).
5. Guest Editor of the Journal “Advances in Optical Technologies”, Special Issue “Correlation Optics” (2010, 2014, 2016)
6. Guest Editor of the Journal “Applied Optics”, Special Issue “Correlation Optics” (2012, 2014, 2016)
7. Editor of 10 Proceedings of SPIE published in SPIE-Press: V. 2108 (1993), 2647 (1995), 3317 (1997), 3904 (1999), 4607 (2001), 5477 (2003), 6254 (2005), 7008 (2007), 7388 (2009), 8338 (2012), 9809 (2015).
8. Organized conferences, workshops and councils in optics of the former USSR: ‘Workshop on holography, 1987
9. ‘Session of Academic Council of the USSR's Ministry of Education on the topic "Optical processors," 1986, 1989
10. ‘Session of Academic Council of the USSR's Ministry of Education on the topic "Laser Systems," 1988
11. Head of Council for Ph.D. Theses Defense in major area "Optics" at Chernivtsi State University, 1993-1998
12. Member of Editorial Boards for *Optica Applicata* (since 1994), *Journal of Optics A: Pure and Applied Optics* (1998-2005), *Ukrainian Journal of Physical Optics* (since 2000), and *Journal of Holography and Speckle* (since 2004), Annals of the Academy of Romanian Scientists, Physics Series (since 2010).
13. Member, International Editorial Advisory Board of Opto-Electronics Review (O-ER) (since 2007), Open Optics Journal (since 2007).
14. Reviewer for *Journal of the Optical Society of America, Applied Optics, Optics Letters, Measurement Science and Technology, Journal of Optics A: Pure and Applied Optics, Optics Express.*
15. Member, Committee for Awarding State Prizes in the field of science and technology in Ukraine (since 1998)
16. Scientific advisor for Ph.D. students at Chernivtsi National UniversityFaculty advisor of SPIE Students Chapter in Chernivtsi National University (since 2001)
17. The topical editor of the “Optoelectronics Review” journal with the citation index higher than 1,1 (since

2009).
18. The President of the Ukrainian society “Pure and Applied Optics” (2009-now).
19. The initiator and organizer of Ukraine’s entering the European Optical Society in 2009.
20. The member of the Editorial Board for SPIE Reviews (2009-2012).

EMPLOYMENT HISTORY

1979-1982 Post-graduate student, Chernivtsi State University

1983-1985 Assistant Professor, Department of Optics, Chernivtsi State University

1985-1988 Associate Professor, Department of Correlation Optics, Chernivtsi State University

1988-present Head, Department of Correlation Optics, Chernivtsi National University

1991-present Professor, Department of Correlation Optics, Chernivtsi National University

1997-2013 Dean, Engineering Faculty, Chernivtsi National University

2013-present Director of Institute of Physical, Technical and Computer Sciences, Chernivtsi National University

SIGNIFICANT PUBLICATIONS AND PATENTS:

Monographs:

1. O.V.Angelsky, P.P.Maksimyak, S.Hanson The Use of Optical - Correlation Techniques for Characterizing Scattering Object and Media, SPIE Press PM71, Bellingham, 1999, 199p.
2. O.V. Angelsky, P.P. Maksimyak. Optical Correlation Diagnostics of Surface Roughness / In: *Handbook of Coherent Domain Optical Methods. Biomedical Diagnostics, Environmental and Material Science*, ed. by V.V. Tuchin (Boston, Kluwer Academic Publishers), V. 1 (2004), pp. 43-92.
3. "New Direction in Holography and Speckle" - Ed. by Chandra Vikram, H.J. Caulfield.- American Scientific Publishers (chapter "Speckles and Phase Singularities in Polychromatic Fields" O.V. Angelsky, P.V. Polyanskii, P.P. Maksimyak), 2008, pp. 37-53.
4. Optical Correlation Applications and Techniques, PM168 ed. by O. Angelsky, SPIE Press, Bellingham, 2007, 270 P.
5. “Handbook of Photonics for medical Science” - Ed. by Tuchin V.V. - Taylor and Francis Publ. (chapter “Statistical, Correlation and Topological Approaches in Diagnostics of the Structure and Physiological State of Birefringent Biological Tissues” O. V. Angelsky, A. G. Ushenko, Yu. A. Ushenko, V.P. Pishak, A.P. Peresunko), 2009. p.p. 22-67.
6. O.V. Angelsky, P.V. Polyanskii, P.P. Maksimyak, I.I. Mokhun, C.Yu. Zenkova, H.V. Bogatyryova, Ch.V. Felde, T.M. Boichuk, V.T. Bachinskiy, A.G. Ushenko, “Optical measurements: polarization and coherence of light fields”. [in] Modern Metrology Concerns. - Monograph, ed. by Luigi Cocco. - InTech, ISBN 959-953-307-336-0. (54 pp). http://www.intechopen.com/books/modern-metrology-concerns/the-state-of-the-art-ande-prospects-of-metrology
7. O.V. Angelsky, P.V. Polyanskii, P.P. Maksimyak, I.I. Mokhun (2012). “Some Current Views on Metrology of Coherence and Polarization in Sight of Singular Optics, [in:] Handbook of Coherence-Domain Optical Methods”. Second Edition, V.V. Tuchin (Ed.), Chapter 2 (41 pp). http://www.allbookstores.com/V-V-Tuchin/author

JOURNAL ARTICLES:

1982

1. O. V. Angel'skii and V. K. Polyanskii. “Possibilities of holographic separation of the useful signal”. // Translated from Zhurnal Prikladnoi Spektroskopii, Vol. 37, No. 4, pp. 636-640, October, 1982.

1984

1. O.V.Angelsky, V.V.Yatsenko, D.I.Derkach “The application of the holographic technique for measuring distribution on the velocities of Brownian movement of the scattering medium”, *Optics and Spectroscopy,* v.57, Issue 5, p.899-904, 1984;

1985

1. O.V.Angelsky, P.P.Maksimyak “The informative possibilities of the holographic technique for investigating the Brownian movement of scattering particles”, *Optics and Spectroscopy,* v.58, Issue 3, p.23-628, 1985;
2. 0. V. Angel'skii, V. V. Yatsenko and D. I. Derkach “Possibility of an optimal choice of the exposure time in holographic recording of objects through nonsteady scattering media” // Translated from Zhurnal Prikladnoi Spektroskopii, Vol. 42, No. 1, pp. 118-122, January, 1985.

1986

1. O.V.Angelsky, P.P.Maksimyak “The investigation of the transformation phenomenon of the longitudinal correlation function of the field propagating in the light scattering medium”, *Optics and Spectroscopy,* v.60, Issue 2, p.331-336, 1986;
2. O.V.Angelsky, P.P.Maksimyak, V.G.Zhitaryuk “On the possibility of the correlativeoptical investigation of phase- inhomogeneous statistic surfaces”, *Optics and Spectroscopy,* v.60, Issue 5, p.1013-1017, 1986;

1987

1. O.V.Angelsky, P.P.Maksimyak “To the possibility of the correlative-optical measurement of parameters of heavily rough surfaces”, *Optics and Spectroscopy,* v.63, Issue 3, p.585- 588, 1987;

1989

1. O.V.Angelsky, G.K.Kurek, I.I.Magun, P.P.Maksimyak «The investigation of statistical moments amplitude and phase of the optical radiation field scattered by chaotic phase screen», *Optics and Spectroscopy,* v.66, Issue 4, p.835-838, 1989;
2. O.V.Angelsky, I.I.Magun, P.P.Maksimyak «The investigation of the statistics of phase - inhomogeneous objects by the correlative - optical techniques», *Optics and Spectroscopy,* V.67, Issue 5, p.1173-1177, 1989;
3. O.V.Angelsky, I.I.Magun, P.P.Maksimyak «Optical correlation methods in statistical studies of random phase objects.» *Optics Communications,* v.72, No.3,4, pp.153-156, 1989.

1990

1.Angelsky O.V., Maksimyak P.P. «Optical diagnostics of random phase objects.» *Applied Optics,* v.29, No. 19, pp.2894-2898, 1990.

1991

1. O.V.Angelsky, P.P.Maksimyak «To the new possibilities in defining slightly rough surfaces», *Optics and Spectroscopy,* v.70,
Issue 3, p.598-603, 1991;
2. Angelskii, O.V., Maksimyak, P.P., Magun, I.I., Perun, T.O., “Spatial stochastization of optical fields and the possibility of optical diagnostics of objects with large phase inhomogeneities”, *Optics and Spectroscopy (English translation of Optika i Spektroskopiya),* 71 (1), pp. 72-75, 1991;
3. O.V.Angelsky, P.P.Maksimyak «The investigation of phase inhomogeneous objects and media by using polarization interferometer», *Optics and Spectroscopy,* v.71, Issue 2, p.378-381, 1991;
4. O.V.Angelsky, N.N.Dominikov, P.P.Maksimyak «The role of reference wave in forming an image reconstructed from a hologram without a reference beam», *Journal of Modern Optics,* v.38, No.l, pp.5-9, 1991;
5. O.V.Angelsky, I.A.Buchkovsky, P.P.Maksimyak, T.O.Perun «A fast interference method for measuring the degree of surface roughness», *Journal of Modern Optics,* v.38, No.l, pp.1-4, 1991;
6. O.V.Angelsky, P.P.Maksimyak «Interference correlator for measuring surface roughness», *Journal of Modern Optics,* v.38, No.8, pp1483-1486, 1991.

1992

1. Angelskii, O.V., Maksimyak, P.P., Perun, T.O., “Correlational optical method for estimating the dimension of the spatial chaos in optical fields”, *Optics and Spectroscopy (English translation of Optika i Spektroskopiya),* 73 (5), pp. 555-557, 1992.
2. O.V.Angelsky, P.P.Maksimyak «Optical diagnostics of slightly rough surfaces», *Applied Optics,* v.31, No.l, pp.140-143, 1992.
3. O.V.Angelsky, P.P.Maksimyak «Polarization-interference measurement of phaseinhomogeneous objects», *Applied Optics,* v.31, pp.4417-4419, 1992.
4. O.V.Angelsky, I.I.Magun, P.P.Maksimyak, T.O.Perun «Optical diagnostics of Large-Scale Roughness»

Journal of Modern Optics, v.39, No.5, pp. 1155-1159, 1992.

1993

1. O.V.Angelsky, P.P.Maksimyak «Holographic studies of the dynamic and structural characteristics of biological objects», *Optical Engineering,* v.32, No.2, pp.267-270, 1993.
2. O.V.Angelsky, P.P.Maksimyak, T.O.Perun «Optical correlation method for measuring spatial complexity in optical fields», *Optics Letters,* v.18, No.2, p.90-92, 1993.
3.O.V.Angelsky, P.P.Maksimyak, T.O.Perun «Dimensionality in optical fields and signals.» *Applied Optics,* v.32, No.30, pp.6066-6071, 1993.
4.O.V.Angelsky, P.P.Maksimyak «Optical correlation method for studying disperse media.» *Applied Optics,* v.32. No.30, pp.6137- 6141, 1993.
5.O.V.Angelsky, P.P.Maksimyak «Optical correlation devices for measuring randomly phased objects», *Optical Engineering,* v.32, No.12, pp.3235-3243, 1993.
6.O.V. Angelskii, M.T. Strinadko, B.M. Timochko, N.N. Dominikov. Holographic recording of distant objects. // Optics and spectroscopy. - 74:55. pp. 591-594. 1993.

1995

1. O.V.Angelsky, P.P.Maksimyak, «Optical Correlation Diagnostics of Random Field and Objects», *Optical Engineering,* No.34, pp.973-981 (1995).
2. O.V.Angelsky, M.T.Strinadko, B.M.Timochko, N.N.Dominikov «Laboratory experiment concerning holographic recording of distant objects», *Pure and Applied Optics,* v.4, pp.55-60, 1995;

1997

1. O.V.Angelsky, A.V.Kovalchuk, P.P.Maksimyak «On the feasibility of diagnostics of onedimensional amplitude fractals», *Pure and Applied Optics,* v.6, pp.435-442, 1997.
2. O.V.Angel'skii, R.N.Besaga, I.I.Mokhun' «Fine structure of a small - amplitude regions», *Optics and Spectroscopy,* v.82, No.4, p.574-581, 1997.
3. O.V.Angelsky, R.N.Besaha, I.I.Mokhun, "Appearance of wave front dislocations under interference among beams with simple wave fronts", *Optica Applicata,* V. XXVII, No. 4, pp.273-278, 1997.

1998

1. O.V.Angelsky, A.V.Konovchuk, P.V.Polyanskii «Reproduction properties of referenceless fractalograms», *Pure and Applied Optics,* v.7, No.3, pp.421-433, 1998;
2. O.V.Angelsky, P.P.Maksimyak «Optical correlation measurements of the structure parameters of random and fractal objects», Measurement, Science and Technology, ***v.9, pp.1682-1693, 1998.***

1999

1. O.V.Angelsky, A.V.Konovchuk, P.V.Polyanskii «Off-axis quadric fractalogram», *Journal of Optics A: Pure and Applied Optics*, v.1, No.1, pp.15-24, 1999;
2. O.V.Angelsky, A.V.Kovalchuk, P.P.Maksimyak, «Optical diagnostics of asymmetrical fractal structures», *Journal of Optics A: Pure and Applied Optics,* v.1 No.l, pp.103-108, 1999.
3. O.V.Angelsky, N.N.Dominikov, P.P.Maksimyak, T.Tudor «On experimental revealing of polarization waves», *Applied Optics,* v.38 No.14, pp.3112-3117, 1999.
4. O.V.Angel'skii, A.G.Ushenko, A.D.Archelyuk, S.B.Ermolenko, D.N.Burkovets «Structure of matrices for the transformation of laser radiation by biofractals», *Quantum Electronics,* v.29, No.12, pp.1074-1077, 1999.
5. O.V.Angelsky, P.P.Maksimyak, S.Hanson *The Use of Optical - Correlation Techniques for Characterizing Scattering Object and Media,* SPIE Press PM71, Bellingham, 1999, 199p.

2000

1. O. V. Angel'skii, A. G. Ushenko, S. B. Ermolenko, D. N. Burkovets, V. P. Pishak, Yu. A. Ushenko and O. V. Pishak "Polarization- Phase Visualization and Processing of Coherent Images of Fractal Structures of Biotissues" // *Journal of Applied Spectroscopy*, v.67 ,No 5 , pp. 919-923 , 2000.
2. Angel'skii O.V., Ushenko, A.G., Arkhelyuk, A.D., Ermolenko, S.B., Burkovets, D.N., Ushenko, Yu.A. "Laser Polarimetry of Pathological Changes in Biotissues", *Optics and Spectroscopy (English translation of Optika i Spektroskopiya),* 89 (6), pp. 973-978, 2000. '
3. Angel'skii, O.V., Ushenko, O.G., Burkovets, D.N., Arkhelyuk, O.D., Ushenko, Yu.A.

"Polarization-correlation studies of multifractal structures in biotissues and diagnostics of their pathologic changes", *Laser Physics,* 10 (5), pp. 1136-1142, 2000.
4. Angel'skii, O.V., Ushenko, A.G., Ermolenko, S.B., Burkovets, D.N., Pishak, V.P., Ushenko, Yu.A., Pishak, O.V., "Polarization- based visualization of multifractal structures for the diagnostics of pathological changes in biological tissues", *Optika i Spektroskopiya,* 89 (5), pp. 866-871, 2000.

2001
1. O.Angelsky, A.Kovalchuk, P. Maksimyak "Study of optical field diffracted by multifracttals", *Journal of Optics A: Pure Applied Optics.*, No.3, pp.34-38, 2001.
2. O.V.Angelsky, P.P.Maksimyak, S.Reed, and V.V. Ryukhtin "Optical control of monocrystalline films", *Optical Engineering,* V.40, pp.2227-2233, 2001.
3. O.V.Angelsky, P.P.Maksimyak, S.G.Hanson, V.V. Ryukhin "New Feasibilities for Characterizing Rough Surfaces by Optical- Correlation Techniques", *Applied Optics,* V.40, pp. 5693-5707, 2001.
4. Angel'skii, O.V., Ushenko, A.G., Burkovets, D.N., Ushenko, Yu.A. "Polarization-correlation analysis of anisotropic structures in bone tissue for the diagnostics of pathological changes", *Optika i Spektroskopiya,* 90 (3), pp. 521-525, 2001

2002
1. O.V.Angelsky, I.I.Mokhun, A.I.Mokhun, M.S.Soskin "Interferometric methods in diagnostics of polarization singularities",
Physical Review E, V.65 (2002), 036602.
2. O.Angelsky, D.Burkovets, A.Kovalchuk, P.Maksimyak "On the fractal description of rough surfaces", *Applied Optics,* V. 41, No 22, pp. 4620-4629, 2002.
3. I.Freund, A.I.Mokhun, M.S.Soskin, O.V.Angelsky, I.I. Mokhun "Stokes Singularity Relations", *Optics Lettters,* V.27, N.7, pp.545- 547, 2002.
4. O.V.Angelsky, A.Mokhun, I.Mokhun, M.Soskin "The relationship between topological characteristics of component vortices and polarization singularities" *Optics Communications,* V. 207, pp. 57-65, 2002.
5. Oleg V. Angelsky, A.G. Ushenko, D.N. Burkovets, Yu.A. Ushenko "Laser polarization visualization and selection of biotissue images", *Optica Applicata,* V. 32, No 4, pp. 591- 601, 2002.
6. Oleg V. Angelsky, A.G. Ushenko, D.N. Burkovets, Yu.A. Ushenko, R. Jozwicki, K. Patorski "Automatic polarimetric system for early medical diagnosis by biotissue testing", *Optica Applicata,* V. 32, No 4, pp. 602-612, 2002.
7. Oleg V. Angelsky, V.K.Polyanskii, P.V. Polyanskii "Scattering-induced spectral changes as a singular optical effect", *Optica Applicata,* V. 32, No 4, pp. 843-848, 2002.
8. Freund I, Mokhun A., Soskin M., Angelsky O., Mokhun I. Stokes singularity relations. // Opt. Lett. - 2002. - V. 27. - N° 7. - P. 545547.

2003
1. O.Angelsky, D.Burkovets, P.Maksimyak, S.G. Hanson "Applicability of the singularoptics concept for diagnostics of random and fractal rough surfaces", *Applied Optics,* V. 42, No 22, pp. 4529-4540, 2003.
2. Oleg V. Angelsky, Dimitry N. Burkovets, Alexander V. Kovalchuk, Steen G. Hanson, "Fractal properties of rough surfaces",
Proc SPIE, V.4829, pp. 589-591, 2003.
3. Oleg V. Angelsky, Alexey I. Mokhun, Igor I. Mokhun, Marat S. Soskin, "Interferometric methods in diagnostics of polarization singularities", *Proc SPIE,* V.4829, pp. 479-480, 2003.
4. Oleg V. Angelsky, Alexander G. Ushenko, Dimitry N. Burkovets, Olga V. Pishak, Yuriy A. Ushenko, Vasyl P. Pishak, "Laser polarization visualization and selection of biofractal images", *Proc SPIE,* V.4829, pp. 188-189, 2003.
5. Oleg V. Angelsky, Alexander G. Ushenko, Dimitry N. Burkovets, Olga V. Pishak, Yuriy A. Ushenko, Vasyl P. Pishak "Polarization two-dimensional processing of birefringence images", *Proc SPIE,* V.5227, pp. 97-107, 2003.
6. Alexander G. Ushenko, Oleg V. Angelsky, Dimitry N. Burkovets, Yuriy A. Ushenko "Wavelet processing of polarization images biotissue architechtonics", *Proc SPIE,* V.5227, pp. 67-72, 2003.

2004
1. Oleg V. Angelsky, Peter P. Maksimyak, Alexander P. Maksimyak, Steen G. Hanson, Yuriy A. Ushenko "Role

of Caustics in the Formation of Networks of Amplitude Zeros for Partially Developed Speckle Fields ", *Applied Optics,* V. 43, No 31, pp. 5744-5753, 2004.
2. O.V.Angelsky, A.G. Ushenko, D.N. Burkovets, Yu.A.Ushenko "Wavelet-analysis of twodimensional birefringence images of architectonics in biotissue for diagnosting pathological changes", *Journal of Biomedical Optics* (SPIE press), V. 9, No. 4, pp.679-690, 2004.
3. Igor I. Mokhun, Alexander Mokhun, Ju Viktorovskaya, Dan Cojoc, Oleg V. Angelsky, Enzo Di Fabrizio « Orbital angular momentum of inhomogeneous electromagnetic field produced by polarized optical beams », *Proc. SPIE,* V.5514, p. 652-662, (2004).
4. Dan Cojoc, Enrico Ferrari, Valeria Garbin, Alessandro Carpentiero, Radu Malureanu, Igor I. Mokhun, Oleg V. Angelsky, Enzo Di Fabrizio « Optical trapping and micromanipulation in microchannels with various configurations », *Proc. SPIE,* V.5514, p.82-90, (2004).
5. O.V. Angelsky, P.P. Maksimyak. Optical Correlation Diagnostics of Surface Roughness / In: *Handbook of Coherent Domain Optical Methods. Biomedical Diagnostics, Environmental and Material Science,* ed. by V.V. Tuchin (Boston, Kluwer Academic Publishers), V. 1 (2004), pp. 43-92.
6. Angelsky O.V., Demianovsky G.V., Ushenko A.G., Burkovets D.N., Yu.A. Ushenko. "Wavelet analysis of two-dimensional birefringence images of architectonics in biotissues for diagnosing pathological changes" // J. Biomed. Opt. - 2004. - V.9, No.4. - P.679-690.

2005

1. Oleg V. Angelsky, Steen G. Hanson, Alexander P. Maksimyak, Peter P. Maksimyak "On the feasibility for determining the amplitude zeroes in polychromatic fields", Optics Express, V. 13, No. 12, pp. 4396-4405, 2005.
2. O.V.Angelsky, A.G. Ushenko, D.N. Burkovets, Yu.A.Ushenko "Polarization visualization and selection of biotissue image two- layer scattering medium", *Journal of Biomedical Optics (SPIEpress),* V. 10, No. 1, pp.1-12, 2005.
3. Angelsky O.V., Maksimyak A.P., Maksimyak P.P., Hanson S.G., Ushenko Y.A. "The role of caustics in formation of network of amplitude zeroes for partially developed speckle field", *Appl. Opt.* - 2004. - 43, No.31 - P. 5762-5771.
4. O.V. Angelsky, S. G. Hanson, A. P. Maksimyak and P. P. Maksimyak, "Interference diagnostics of white-light vortices" Opt. Express 13, 8179-8183 (2005).
5. O. V. Angelsky, S. G. Hanson, A. P. Maksimyak, and P. P. Maksimyak, "Feasibilities of interferometric and chromfscopic technics in study of phase singlarities" *Appl. Opt.*, 44, No 24, 5091-5100 (2005).
6. O.V. Angelsky, A.G. Ushenko, and Ye.G. Ushenko, "2-D Stokes Polarimetry of Biospeckle TissuesImages in Pre-Clinic Diagnostics of Their Pre-Cancer States," *J. Holography Speckle* 2, 1-8 (2005).
7. O.V. Angelsky, A.G. Ushenko, and Ye.G. Ushenko, "Investigation of the correlation structure of biological tissue polarization images during the diagnostics of their oncological changes," *Phys. Med. Biol.* 50, 4811-4822 (2005).
8. O.V. Angelsky, Yu.Ya. Tomka, A.G. Ushenko, Ye.G. Ushenko and Yu.A. Ushenko, "Investigation of 2D Mueller matrix structure of biological tissues for pre-clinical diagnostics of their pathological states," *J. Phys. D: Appl. Phys.* 38, 4227-4235 (2005).
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THE ESSENCE OF HIS MAIN RESEARCH ACHIEVEMENTS LIES IN THE FOLLOWING:

1. A holographic method for dynamics measurements (diffusion coefficient, root-meansquare velocity distribution function) and structural characteristics (size distribution function) of quasi-spherical Brownian particle ensembles has been proposed and implemented. The method is based on the possibility of holographic extraction of the information on time-frequency structure (Doppler spectrum) of the selected space-frequency component of the scattered light. The time-frequency resolution of a signal can reach 10-5 to 10-6 Hz.
2. The principles of interference correlometry of phase and amplitude statistical moments of scattered coherent light fields have been proposed and elaborated. This serves as the basis of new directions in optical metrology -optical correlometry of the stationary scattered coherent fields. A set of highly efficient methods for the diagnostics of slightly rough surfaces has been developed. Its high sensitivity is based on applying the interconnection of statistical moments inherent to the surface structure and the corresponding statistical parameters of the scattered optical field:

* transversal correlation function;
* amplitude dispersion and phase variance;
* scintillation index.

A novel optical correlation method for measuring the height distribution function of slightly rough surfaces has been proposed and tested. The corresponding measuring devices have been designed and has shown a record measurement rate (full field measurement time of the surface roughness height) - 2 seconds, with a sensitivity threshold in surface roughness on the order of 10 to 12 A. The measuring devices are introduced at a number of enterprises in Ukraine, Russia, and the USA.

3. A new approach to the problem of rough surface diagnostics based on fractal geometry and fractal optics concepts has been developed. The relation of the fractal dimension or singularity spectrum (the set of fractal dimensions) of the object itself with the corresponding parameters of the scattered radiation field is fundamental to rough surface diagnostics. Possibilities for the optical diagnostics of fractal surface structures have been shown.
Within this approach a fast polarization-interference method for measuring the correlation dimension of the chaos in the field has been developed.
Optical correlation techniques for remotely estimating the fractal dimension and Cantor fractal's asymmetry were elaborated and tested based on the analysis of interrelations of the object's fractal dimension and correlation dimension of scattered radiation field on one hand, and the asymmetry coefficients of the object and field - on the other hand.
A technique for classifying rough surfaces as "random" or "fractal" by estimating the distribution of amplitude zeroes of the scattered coherent field has been proposed.
4. New holographic methods have been shown for fractal analysis in modern systems of advanced optical data processing
(holographic recording of fractals of different types) using referenceless holography and static nonlinear holography. New approaches to accessing the fractal dimension of regular (deterministic) fractals by using the information contained in the field of scattered radiation have been elaborated.
5. A novel approach for the analysis of singularities in vector fields has been proposed. The essence of this approach is scalar consideration of the phase vortices at the orthogonal field components. A new type of vortices has been introduced, namely phase- difference vortices.
A sign principle for the phase-difference vortices has been formulated. An interferometric technique for the analysis of a polarization singular skeleton (s-contours and C-points) of a vector field has been elaborated. It has been shown that complete characteristics of C- points as s-contours may be reconstructed form interferometric data.
6. A polychromatic "coloured" speckle-field has been demonstrated experimentally. Two diagnostics techniques of the field amplitude zeroes in polychromatic radiation have been suggested and realized under the names "inverted chromascopic technique" and "interference technique".
At first the "white zero" of the field amplitude has been diagnosed by interference methods. A white zero is a point where amplitude zeroes of all field spectral components coincide in location. The amplitude zeroes birth and annihilation effects for discrete spectral components of polychromatic field have been illustrated experimentally.
7. The elaborated and tested principles for the correlation-optical diagnostics of statistical and fractal objects, have been used to form the basis for non-invasive techniques of polarization-correlation diagnostics for biological tissues in medicine, such as bone tissue, muscle tissue and skin.
Testing these techniques was showed its perspective for the discovering biological tissues early pathologies, e.g. in the task for preclinical differentiation of pathologically changed and normal biological tissues.
8. It was shown: when the surface roughness is comparable with the probing radiation wavelength, the scattered field contains both the coherent nature regular (forward-scattered) component and the diffusely scattered part. Coloring of the regular white light component scattered by a colorless dielectric slab with a rough surface is considered as a peculiar effect of singular optics with zero (infinitely extended) interference fringes. The chromascopic technique applying is shown that the normalized spectrum modifications of the white light forwardscattered can be interpreted as the effect of a quarter-wavelength (anti-reflecting) layer for some polychromatic probing beam spectral component.
9. The feasibility for rough surfaces diagnostics with large surface inhomogeneities exceeding the probing radiation wavelength by investigation of the longitudinal coherence function transformation for a polychromatic field was shown experimentally.
10. It was shown, that two-beam interference technique that results in an appreciable level of spin flow in moderately focused beams and detection of the orbital motion of probe particles within a field where the transverse energy circulation is associated exclusively with the spin flow. This result can be treated as the first demonstration of mechanical action of the spin flow of a light field.
11. Firstly, it was experimentally demonstrated the physical existence and mechanical action of the extraordinary transverse component of the spin arising in an evanescent light wave due to the total internal reflection of a linearly polarized probing beam with azimuth 45° at the interface between the birefringent plate

and air
12. It is demonstrated the possibility of the generation and evolution of single bubbles and ensembles of bubbles with controllable sizes and numbers, which are grouped within the laser-illuminated region and form quasi-ordered structures. The results are useful for applications associated with the precise manipulation, sorting and specific delivery in nano- and micro-engineering problems.