VI World Congress "Aviation in the XXI Century" - "Safety in Aviation and Space Technology"

Microwaves, Radar and Remote Sensing Symposium MRRS-2014

International Cooperation in the Field of Aviation Electronics and Remote Sensing

Інститут Аеронавігації

Felix J. Yanovsky

Electronics Department

National Aviation University (NAU)

Kiev, Ukraine

yanovsky@nau.edu.ua

IEEE Signal Processing Society

IEEE Central Ukraine Joint Chapter 2007

	Міжнародне співробітництво
1	Підготовка фахівців для зарубіжних країн
2	Співробітництво із зарубіжними вищими навчальними закладами
3	Читання лекцій в університетах інших країн
4	Участь у міжнародних асоціаціях
5	Участь в організації конференцій за кордоном
6	Організація міжнародних конференцій в Україні
7	Підготовка заявок на спільні проекти і гранти
8	Виконання спільних наукових проектів
9	Наукові публікації у закордонних видавництвах

1. Підготовка фахівців для зарубіжних країн

Студент з В'єтнаму – переможець фіналу Всеукраїнського конкурсу в Харкові зі своїм керівником

Данг Ван Тхо

2. Співробітництво із зарубіжними вищими навчальними закладами

- Delft University of Technology, Netherlands
- Hamburg-Harburg Technical University, Germany
- Warsaw University of Technology, Poland
- Hanyang University, Seoul, South Korea
- Czech Technical University in Prague, Czech Republic
- Budapest University of Technology and Economics, Hungary
- Dublin Institute of Technology, Ireland
- Ecole Centrale de Nantes, France
- University of Trento, Italy
- University of the Basque Country, Spain
- University of Southampton, United Kingdom
- State Engineering University of Armenia, Armenia
- Belarusian National Technical University, Minsk, Belarus
- Georgian Aviation University, Georgia
- Technical University of Moldova, Moldova

3. Читання лекцій закордоном у:

- TU-Delft, Netherlands (1996-1998, 2003, 2004)
- PennState University, PA, USA (1997)
- University of Virginia, Charlottesville, USA (2002)
- TUHH, Гамбург, Німеччина, 2005
- Al-Balqa Applied University/Al-Huson University College, Йорданія (2007)
- Hanyang University, Сеул, Південна Корея (2008)
- Chinese Academy of Science, Пекін, КНР (2010)
- Warsaw University of Technology, Польща (2010, 2013, 2014)
- University of Tripoli, Libya (1995-2011)
- ITSS on Microwaves & Lightwaves, ITSS-2000 (Москва), ITSS-2001 (Мадрид), ITSS-2002 (Мінськ), ITSS-2006 (Варшава)

4. Участь у міжнародних асоціаціях

- IEEE
- EuMA
- Central Ukraine IEEE SP/AES Joint Chapter
- IEEE NAU Student Branch

- http://ieee.nau.edu.ua
- http://ieee.org
- http://www.eumwa.org/

IEEE Central Ukraine Joint Chapter

IEEE Central Ukraine Joint Chapter 2007

September 23-25, 2014 - MRRS 2014 Symposium

IEEE Central Ukraine Joint Chapter

Welcome to the homepage of the IEEE Central Ukraine Joint Chapter of the SP and AES Societies that was created in 2007 by the initiative of 16 founder IEEE members.

The Chapter Committee and most of the members are located in Kiev, the capital city of Ukraine.

The Chapter is open for IEEE members who live also in other cities, towns and villages of Ukraine and belong to Signal Processing (SP), Aerospace and Electronic Systems (AES), Geoscience and Remote Sensing (GRS), Computer, and other societies.

Діяльність міжнародної асоціації IEEE

- Активно працює Центрально-український чаптер IEEE, Голова – докторант каф. ел. Ю. Аверьянова.
- У 2012 р. створена студентська гілка IEEE НАУ (IEEE Student Branch of NAU)
- Голова IEEE Student Branch асп. Д. Глушко брав участь у нараді голів регіону 8 IEEE у Мадриді (серпень, 2012).
- 2014 – асп. К. Семенова - Краків

5. Участь в організації та роботі наукових конференцій за кордоном

- **EuMW (EuRAD)** : Amsterdam, Munich (Nurnberg), Manchester, Rome, Paris
- **IRS** : Dresden, Hamburg, Leipzig, Warsaw, Vilnius, Gdansk and other cities
- **MIKON** : Warsaw, Krakow, Wroclaw, Vilnius
- **SPS** : Poland and Lithuania
- **Erasmus Mundus** Meetings in Warsaw, Budapest, Chisinau
- Many others events

http://www.eumweek.com/ European Microwave Week

European Microwave Week

Fiera di Roma, Rome, Italy
5-10 October 2014

EuMW 2014
CONNECTING THE FUTURE

Exhibition Hours:
Tuesday 7th Oct : 09.30 – 17.30 Wednesday 8th Oct: 09.30 – 17.30 Thursday 9th Oct : 09.30 – 16.30

www.eumweek.com

44TH EUROPEAN MICROWAVE CONFERENCE 2014
The 44th European Microwave Conference

EuMIC 2014
The 9th European Microwave Integrated Circuits Conference

EuRAD 2014
The 11th European Radar Conference

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Visit the EuMA Photo Gallery

Registration
Conference Programme
Shuttle Bus Timetable
Application to Exhibit

EN

IRS 2014

15th International Radar Symposium

~~Ukraine, Lviv, June 18-20, 2014~~

Poland, Gdansk, June 16-18, 2014

TUHH

Technical Program Committee

Co-Chairmen

Hermann Rohling

Felix Yanovsky

Krzysztof Kulpa

Registration

Registration Fees

Conference Office

Session Matrix

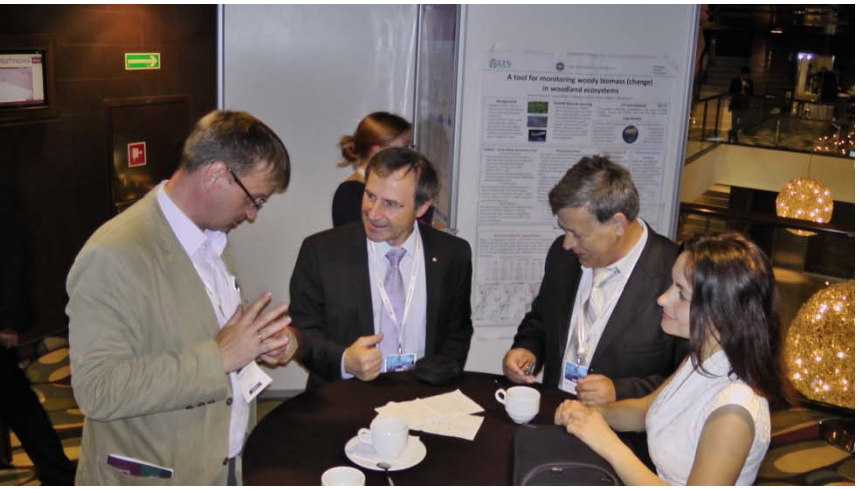
IRS Conference Program

Social Events

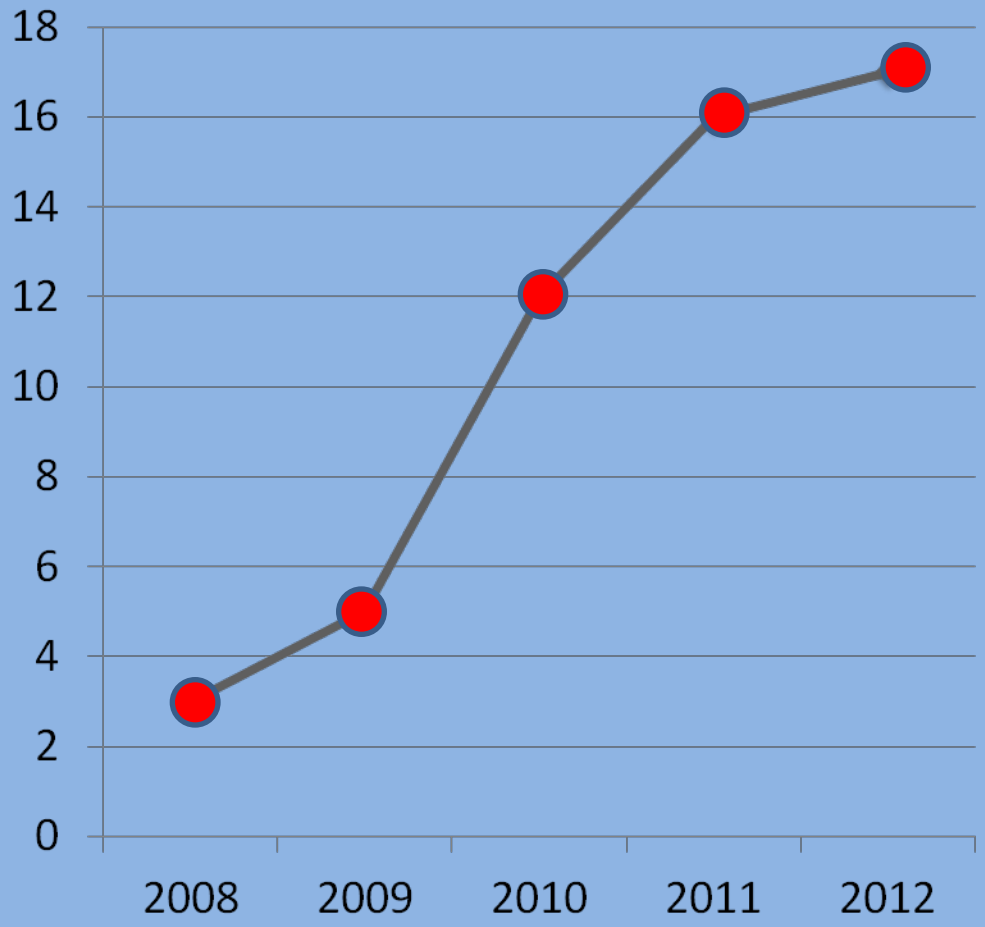
Accommodation

Passport&Visa

IRS-2014 Gdansk



Участь студентів каф. електроніки у міжнародних конференціях



SPS (Варшава)

IRS (Дрезден)

MRRS (Київ)

EuRAD (Амстердам)

MMET (Харків)

IRS, SPS (Вільнюс)

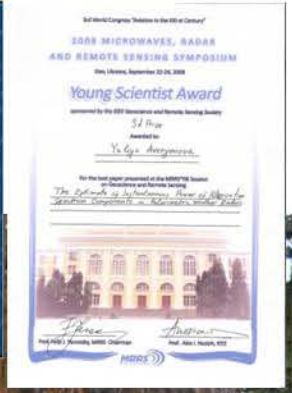
BMES (Hartford, USA)

Jachranka, Poland


EuRAD
2009
ROME, ITALY
12TH EUROPEAN MICROWAVE WEEK
EuRAD YOUNG ENGINEERS PRIZE
Raytheon Company
awarded to
Dmitry Gaushka
for the paper
EuMA
European Microwave Association


Грамота


Kiev, Ukraine
2011 Microwaves, Radar, and Remote Sensing Symposium
EuMA SECOND PRIZE
MRRS
EuMA
European Microwave Association


2008 MICROWAVES, RADAR
AND REMOTE SENSING SYMPOSIUM
Young Scientist Award


EuRAD 2009
Closing Session


EuRAD
2009
ROME, ITALY
EuMA


Young Scientist Award

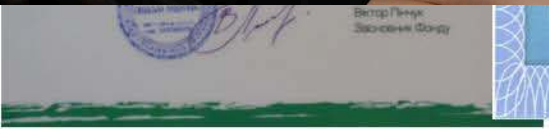

ЗАВТРА.UA


Signal
Processing Symposium
STUDENT PAPER AWARD
3 rd prize


Ksenia Shlevitska
Oksana Volvach


STUDENT PAPER AWARD
3 rd prize
Ksenia Shlevitska

ГРАМОТА

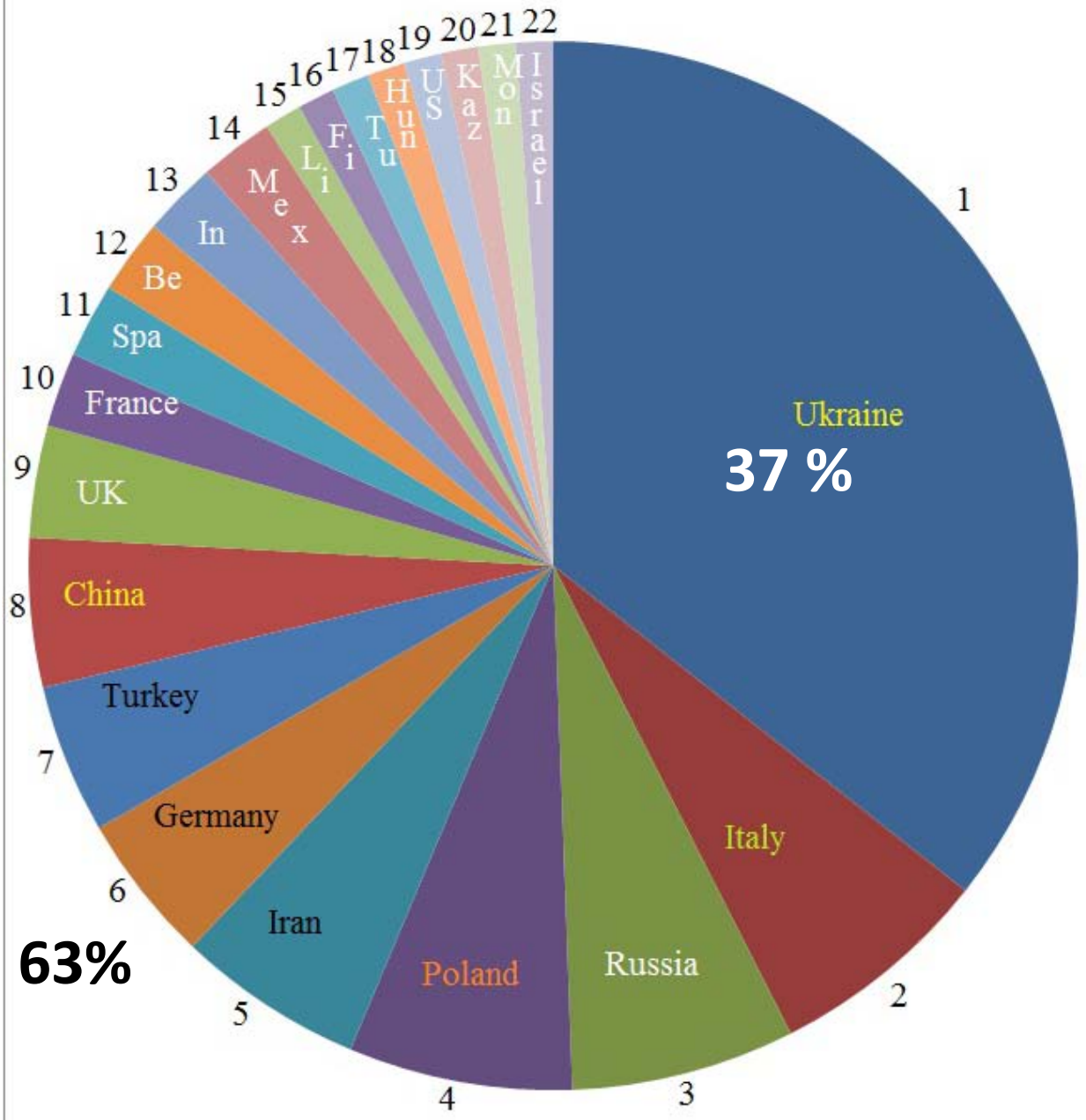



IRS 2012
13th International Radar Symposium
Warsaw, May 23-25, 2012
We are pleased to certify that
Semenova Kseniia
has received the best poster award for the paper entitled „Front-Side-Looking SAR Imaging" presented at 13th International Radar Symposium IRS 2012.
Prof. Krzysztof Kulpa
Conference Co-Chairman
Prof. Herman Rohling
Conference Co-Chairman
Prof. Adam Kawalec
Conference Co-Chairman

6. Організація міжнародних конференцій в Україні

- MRRS (NAU)
- RMSW (NAU)
- SMSDP (NAU) - Statistical Methods f Signal and Data Processing
- MSNMC (NAU) - Methods and Systems of Navigation and Motion Control
- UWBUSIS (Sevastopol, Kharkiv)
- MWSMW (Kharkiv)
- MMET (Kharkiv, Odesa, Dnipropetrovsk, Kyiv)
- UPUAVD (NAU) - Actual Problems of Unmanned Air Vehicles Developments
- ELNANO (спільно з КПІ) and many others

Microwaves, Radar and Remote Sensing Symposium MRRS-2011



- 1 Ukraine
- 2 Italy
- 3 Russia
- 4 Poland
- 5 Iran
- 6 Germany
- 7 Turkey
- 8 China
- 9 UK
- 10 France
- 11 Spain
- 12 Belgium
- 13 India
- 14 Mexico
- 15 Libya
- 16 Finland
- 17 Tunisia
- 18 Hungary
- 19 USA
- 20 Kazakhstan
- 21 Montenegro
- 22 Israel

Найбільша кількість учасників з:

України
Польщі
Італії
Росії
Німеччини

MRRS
Microwaves, radar and remote sensing

НАЦІОНАЛЬНИЙ АВІАЦІЙНИЙ УНІВЕРСИТЕТ MCMXXXIII

IEEE

IEEE Central Ukraine Joint Chapter

AESS IEEE AEROSPACE AND ELECTRONIC SYSTEMS SOCIETY

IEEE GRSS Geoscience and Remote Sensing Society

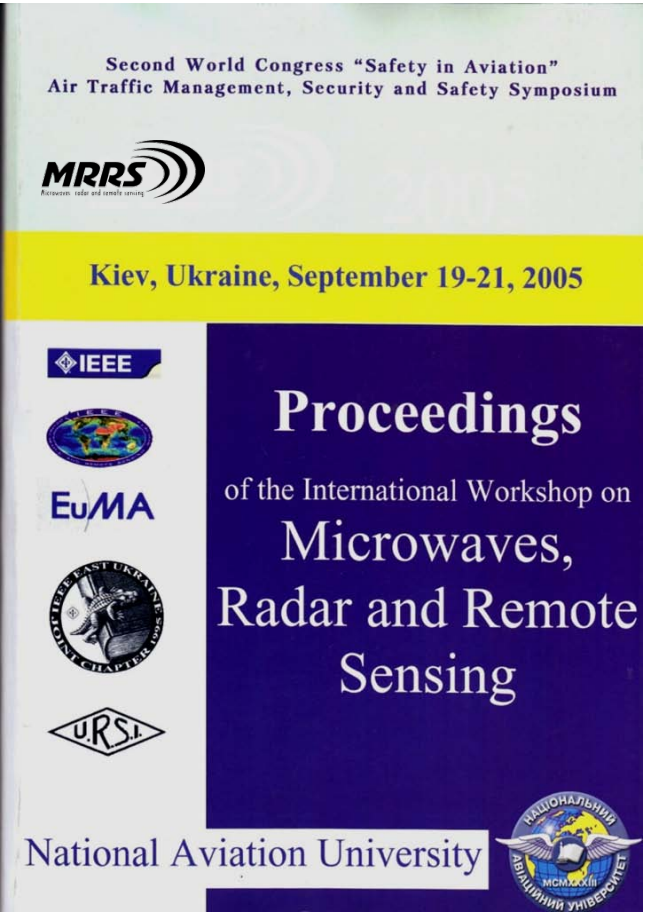
IEEE Signal Processing Society

RED Radioelectronics department

EuMA European Microwave Association

MTT-S

Microwaves, Radar and Remote Sensing Symposium Proceedings



IEEE Xplore
Library of Congress
Scopus
Microsoft Academic Search

MRRS-2014

IEEE Catalog Number: CFP 1452Y PRT
ISBN: 978-1-4788-6578-6

7. Підготовка заявок на спільні проекти і гранти

- CRDF
- TEMPUS
- ERASMUS MUNDUS
- HORISON 2020

Участь у консорціумі за програмою Еразмус Мундус

- Project: EWENT = **E**ast-**W**est **E**uropean **N**etwork on higher **T**echnical education (2012-2015)

Участь у консорціумі за програмою Еразмус Мундус

- Project ACTIVE = **A**tlantic **C**aucasus **T**echnical universities **I**nitiative for **V**aluable **E**ducation (2014-2017)

Meeting in Chisinau

8. Виконання спільних наукових проектів

TU-Delft, Netherlands

Bulgaria

МИНИСТЕРСТВО НА ОБРАЗОВАНИЕТО И НАУКАТА
ФОНД "НАУЧНИ ИЗСЛЕДВАНИЯ"
РЕПУБЛИКА БЪЛГАРИЯ

ПРОЕКТ ЗА СЪВМЕСТНИ НАУЧНИ ИЗСЛЕДВАНИЯ

Стр. 1

Страна:	Партньор на Ф"НИ":	Изследователска област:	Reg. №:
България	Украйна	информационни и комуникационни технологии	(попълва се от Ф "НИ")

Тема: **Цилиндрични вълноводни структури с азимутално намагнитен полупроводник**

Ключови думи (до 6): Цилиндрични вълноводи с г компоненти, невзаимни циф гранични задачи и задачи за електромагнитната теория,

Ръководител на проекта от България:
Доц. Д-р Георгиев Георги Никояов
Подпис:

Институт от България:
Великотърновски Университет „Св. Св. Кирил и Методий"

Ректор:
Проф. Дпн Пламен А. Легкоступ
Подпис:

Пощенски код и адрес:
ул. „Теодосий Търновски" 2, 5003 Велико Търново, България

☎++359 62 64 98 33

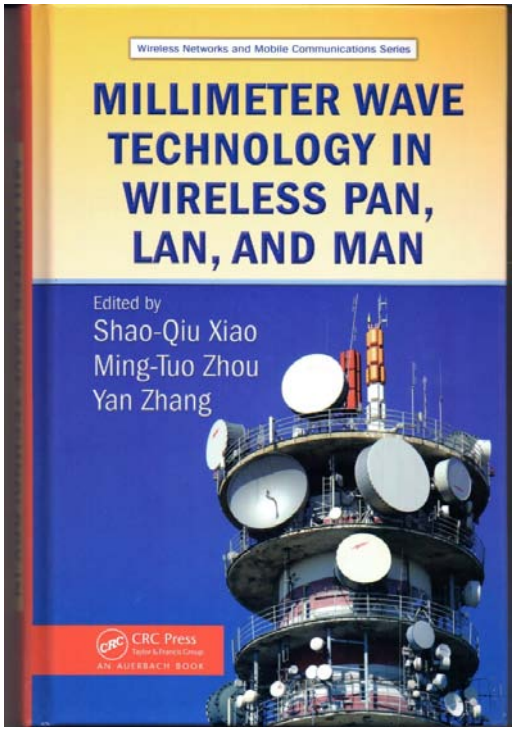
Факс: ++359 62 62 80 23

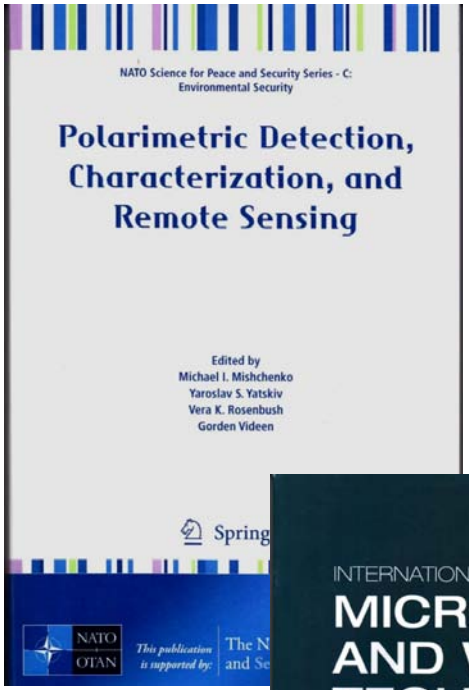
e-mail: gngeorgiev@yahoo.com

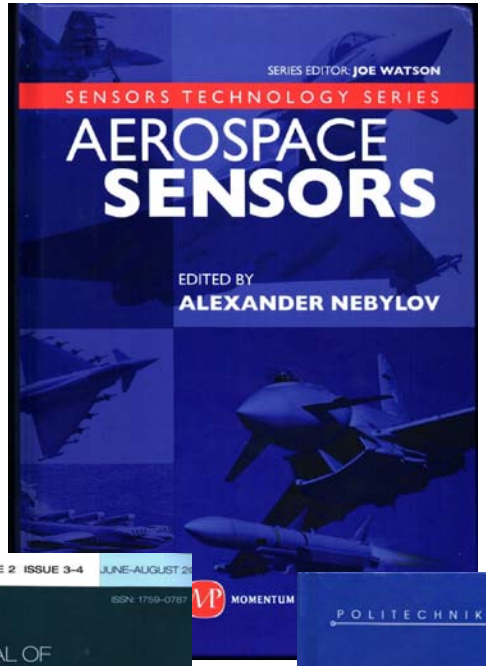
12. ПІДПИСИ / SIGNATURES

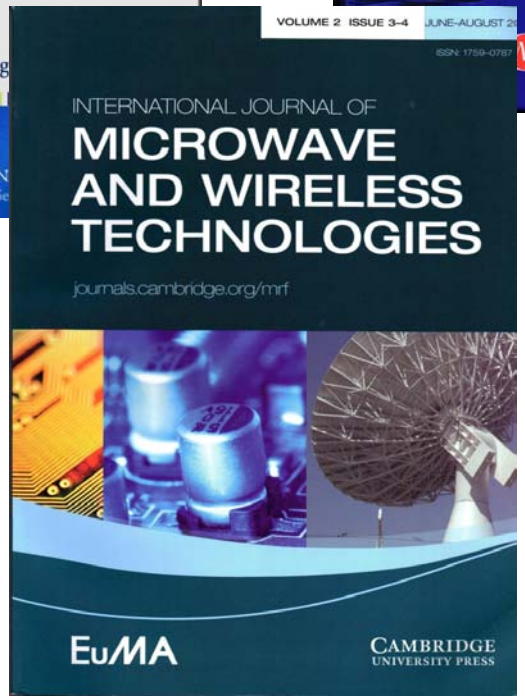
КЕРІВНИК ПРОЕКТУ PROJECT LEADER	УКРАЇНА UKRAINE	БОЛГАРІЯ BULGARIA
1. **Ім'я і прізвище First and last names**	Фелікс Яновський Felix Yanovsky	Георгі Георгієв Georgi Georgiev
2. **Дата Date**	29.08.08	
3. **Підпис Signature**		
Установа Institution		
1. **Назва установи Institution name**	Національний авіаційний університет National Aviation University	Університет Велико Тирново ім. Св. Кирила і Мефодія University of Veliko Tirnovo "St. St. Cyril and Methodius"
2. **Директор установи Head of Institution**		
3. **Дата Date**		
4. **Підпис Signature**		

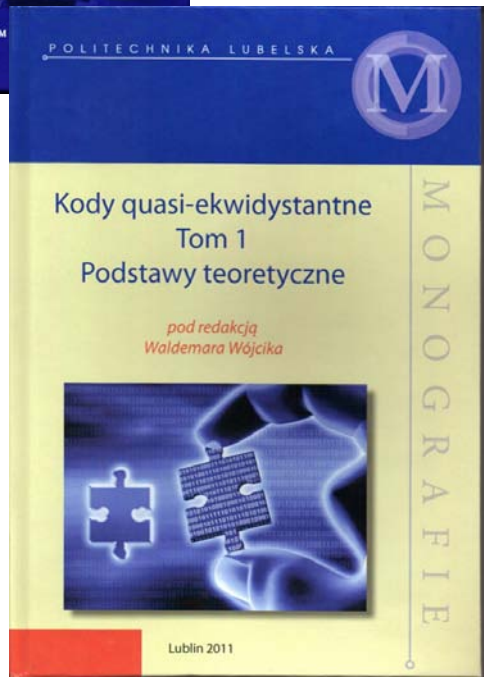
9. Наукові публікації у закордонних видавництвах

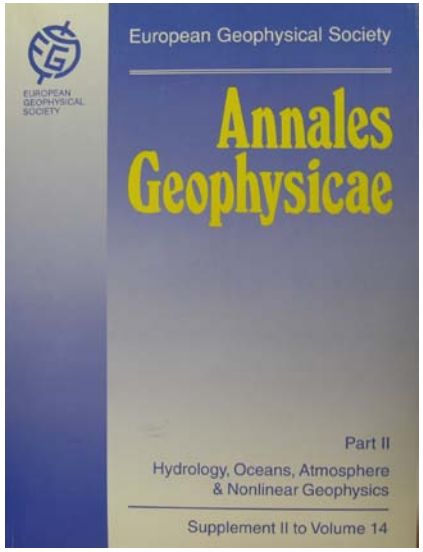


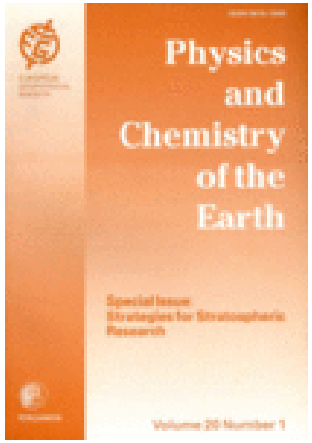




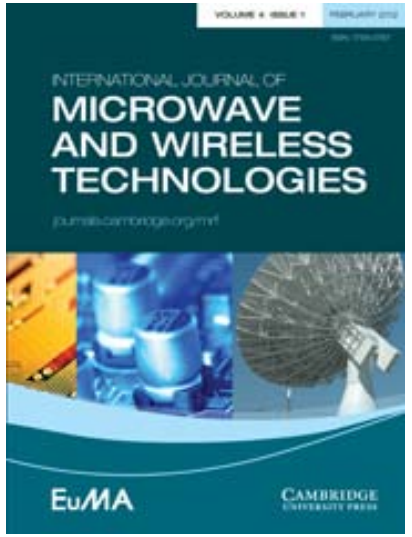




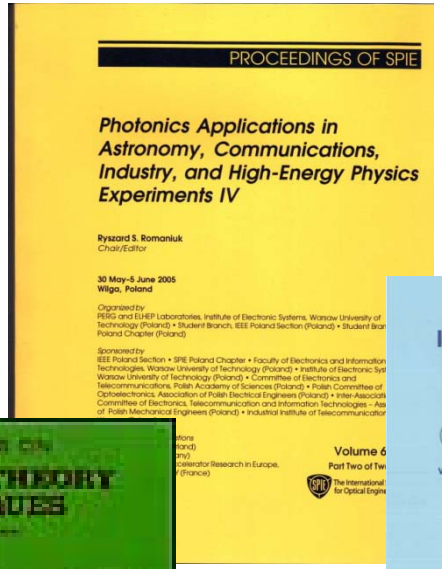

European Geophysical Society
Annales Geophysicae
Part II
Hydrology, Oceans, Atmosphere & Nonlinear Geophysics
Supplement II to Volume 14


Physics and Chemistry of the Earth
Special Issue
Strategies for Stratospheric Research

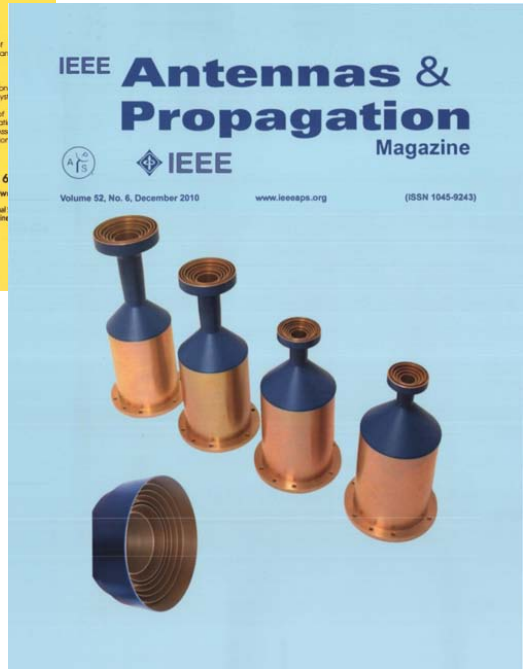

IEEE TRANSACTIONS ON
AEROSPACE AND ELECTRONIC SYSTEMS
JANUARY 2003
VOLUME 39
NUMBER 1
A QUARTERLY PUBLICATION OF THE IEEE AEROSPACE AND ELECTRONIC SYSTEMS SOCIETY
IEEE


INTERNATIONAL JOURNAL OF
MICROWAVE AND WIRELESS TECHNOLOGIES
EuMA
CAMBRIDGE


IEEE
microwave
MAGAZINE
for the Microwave & Wireless Engineer
Volume 10 • Number 1 • February 2009
The Official Media Source of IEEE MTT-Society
International Microwave Symposium
Radio & Wireless Symposium
MTT GOL
New Ideas and New Know


PROCEEDINGS OF SPIE
Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments IV
Ryszard S. Romaniuk
Chair/Editor
30 May–5 June 2005
Wilga, Poland
Volume 6
Part Two of Two


IEEE TRANSACTIONS ON
MICROWAVE THEORY AND TECHNIQUES
IEEE


IEEE Antennas & Propagation Magazine
IEEE
Volume 52, No. 6, December 2010
www.ieeeaps.org
(ISSN 1045-9243)


TELECOMMUNICATIONS AND RADIO ENGINEERING

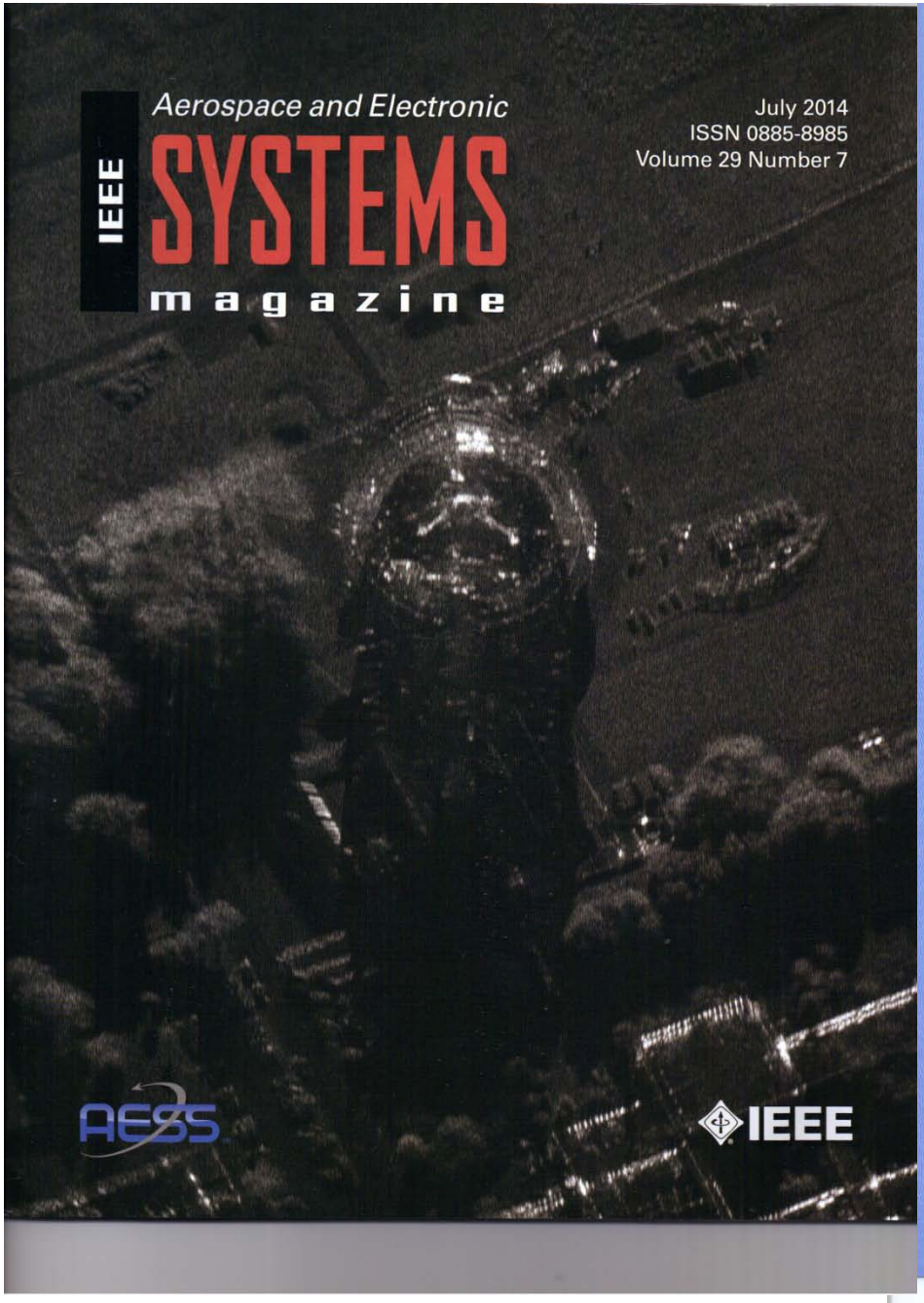
Участь у міжнародній видавницькій діяльності

Associate Editor:

- **International Journal on Microwave and Wireless Technology**, EuMA & Cambrige University Press
- **IEEE Aerospace and Electronic Systems Magazine**

Reviewer :

- **IEEE Transactions on GRS**
- **IEEE Transactions on MTT**
- **IEEE Transactions on AES**



DOI No. 10.1109/MAES.2014.141007

From the Editor-in-Chief
JULY 2014, Continued

Krzysztof Kulpa

Krzysztof S. Kulpa (M-91, SM-10) received his M.Sc., Ph.D. and Dr Sc. degrees from Department of Electronic Engineering, Warsaw University of Technology (WUT) in 1982, 1987 and 2009, respectively. From 1985 to 1988, he worked in the Institute of Electronic Fundamentals, WUT. In the years 1988-1990, he was Assistant Professor at the Electrical Department of Technical University of Bialystok. In the period of 1990-2005, he worked as a scientific consultant in WZR RAWAR company, Poland. Since 1990, he has been Associate Professor in Institute of Electronic Systems (WUT). At present, he serves as the head of Digital Signal Processing Laboratory, and the head of Radar Technology Research Group at WUT. Since 2011, he has been the Scientific Director of Defense and Security Research Center of Warsaw University of Technology.

Professor Krzysztof Kulpa is also a member of EUMA, AOC and URSI, being the chair of Poland Section Commission F: Wave Propagation and Remote Sensing from 2012. He is a member of Technical Program Committees of several major international radar conferences, among others, International Radar Symposium (IRS), European Synthetic Aperture Radar Conference (EUSAR), European Radar Conference EURAD. Presently, he is associate editor of International Journal of Microwave and Wireless Technologies.

Felix Yanovsky

Felix Yanovsky (M-94, SM-96, F-09) graduated as Engineer (with Honors) in 1968 from the Radio Engineering Faculty of the National Aviation University (NAU) in Kiev, Ukraine. In 1979 he defended his PhD dissertation in the Moscow State Technical University of Civil Aviation (MSTUCA), Russia. In 1992, he received D.Sc from NAU, and then in 1993 – the second D.Sc in different specialization from MSTUCA.

All his life Prof. Yanovsky is with NAU. He started there in 1969 at the Department of Radar (Assistant, Senior Lecturer, Associate Professor), since 1992 worked as Full Professor at the Department of Maintenance and Repair of Avionics, in 2000 moved to the Department of Air Navigation Systems, where served as Full Professor and Deputy Head. Since 2008 he is currently the Head of Electronics Department.

In 1996, he was invited to the Delft University of Technology, the Netherlands, where worked 1996 to 2003 on average during several months per year as a Top Scientist, Professor. He consulted various companies of aviation and electronics industry, worked as a Leading Researcher (part-time) in the Kiev State Research Institute "Buran" (2004–2006), and still remains a member of the Scientific and Technical Council of this enterprise.

As invited Professor he delivered lectures at: TU-Delft, The Netherlands; TUHH, Hamburg, Germany; Al-Balqa Applied University, Irbid, Jordan; Hanyang University, Seoul, Republic of Korea; Warsaw University of Technology, Poland; Penn State University (University Park, PA, USA).

As IEEE Fellow Prof. Yanovsky belongs to AES, SP, GRS, and MTT societies, he is founder of IEEE Ukraine SP/AES Joint Chapter. He is also member of EuMA.

F. Yanovsky is the Chairman of the Microwaves, Radar and Remote Sensing Symposium (MRRS) that is regularly held in Kiev since 2005. He is TPC member of European Radar Conference EuRAD, International Radar Symposium IRS, and many other conferences. He is currently member of the Editorial Board and associate editor of the International Journal of Microwave and Wireless Technologies (EuMA and Cambridge University Press).

Editorial:

DOI No. 10.1109/MAES.2014.142007

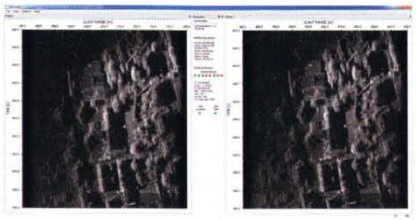
Signal Processing for Remote Sensing Special Issue—July 2014

Krzysztof Kulpa
Warsaw University of Technology, Poland

Felix Yanovsky
National Aviation University, Ukraine

There is a wide range of applications where advanced signal processing techniques are of great significance. The scientists working on signal processing related topics always bring with them new ideas that are often successfully applied in modern technology, such as radar, remote sensing, biomedical applications, plus, of course, voice and image processing. Many of the same ideas and algorithms are applied in other fields, usually under different names. Scientists often repeat research already done by their peers in related disciplines to find the solutions for their own problems.

Radar Technology, with its origins back in the beginning of 20th century, now is the field that attracts scientific/technological efforts strongly related to signal processing research. In the 80's, the idea of software defined radio was born and implemented widely; it has revolutionized the communication market. More than a decade later, the idea of software-defined radar entered. At present, in the modern radar, received echo signal is digitized at the IF frequency, and whole processing is performed digitally in field-programmable gate arrays (FPGAs), digital signal processors (DSPs), GP processors using vector instructions, ðr in graphic processing units (GPUs).



Screenshot of the application showing real-time SAR imagery.

Digital Signal Processing has become the "heart" of modern radar: the purpose of this special issue of our AESS Magazine is to highlight this trend.

Amongst the many radar technologies that have been undergoing rapid development in the last decade, imaging technology is a frontrunner. Four articles in this issue bring radar images – both in synthetic aperture radar (SAR) and inverse synthetic aperture radar (ISAR) modes – into focus. Procedures showing how to create an image without transmitting sounding pulses are described in two of them. The first illustrates how to exploit illuminators of opportunity, and the second – own target thermal radiometric radiation. The last article of this special issue demonstrates a sparse approach to wind turbine clutter cancelation. The fifth paper again is focused on passive radar, but this time on detection, localization and tracking. The last paper shows how to combine radar polarymetry with signal processing to obtain knowledge about the weather.

The first article, "mm-Wave SAR Demonstrator as a Test Bed for Advanced Solutions in Microwave Imaging" by Michael Caris, Stephan Stanko, Mateusz Malanowski, Piotr Samczynski, Krzysztof Kulpa, Arnulf Leuther and Axel Tessmann, shows the recent development of high resolution SAR technology and its potential role as a surveillance sensor for small unmanned arerial vehicles (UAVs). The authors describe in detail the SARape concept – a real-time miniaturized W-band (94 GHz) SAR system which is specially designed for a wide range of manned or unmanned airborne applications – which combines a real-time SAR processor with the miniaturized hardware applicable to very small and compact UAVs. During the experimental test flights, after scrutinizing the required computational power, the structure of the processing algorithms, development time, and the platforms available on the market, the GPU was applied as the most appropriate computational power technology. This articles shows that numerous test campaigns have proved that all real-time processing can be performed using a standard laptop computer equipped with a GPU running under CUDA, enabling to process data from two SAR channels in real time and simultaneously perform interfereometric or polarymetric processing.

The second article, "Coherent Imaging in the Range-Azimuth Plane Using a Bistatic Radiometer Based on Antennas With Beam Synthesizing" by Kostyantyn Lukin, Volodymyr V. Kudriashov, Pavlo Vyplavin, and Vladimir Palamarchuk presents the results of an investigation of coherent radiometric imaging. It describes in detail an experimental study carried out using a bistatic Ka-band ground-based radiometer based upon ground-based noise waveform (GB NW) SAR. This approach – contrary to other radiometric meth-

Doppler Polarization Radar Methods for Meteorological Applications

Yuliya Averyanova, Anatoliy Averjanov, Felix Yanovsky
National Aviation University, Kiev, Ukraine

INTRODUCTION

Since the middle of the 20th century, the radar has significantly improved the capabilities of meteorology and related fields, including atmospheric observations and study, weather forecasting, and dangerous weather phenomena detection. The early radars operated with only one measured parameter: the radar reflectivity factor. A high level of the radar reflectivity factor was interpreted as a high level of danger in the atmosphere. The further development of the meteorological radars was marked with the advances in Doppler measurements [1]. The measurement of Doppler frequency gives information about the radial velocities of hydrometeors and can be used for information extraction about the dynamic processes in the atmosphere. For example, the Doppler spectrum width is the most applicable parameter for turbulence estimation [2]. Unfortunately, a lot of sources for errors during Doppler measurement limit the possibility of unambiguous interpretation of the results. Among them are spectrum broadening due to limited beam width, the influence of the sounding waveform and antenna pattern, the influence of transverse wind on the Doppler spectrum width, velocity measurement ambiguity due to a modulated sounding waveform, inertia of scatterers when measuring turbulence, and the influence of carrier velocity in the case of installing weather radar on a moving platform, say, an aircraft.

The Doppler frequency and the radar reflectivity neither separately nor together can solve unambiguously the problem of obtaining information about the processes and phenomena in clouds and precipitation. The development of radar polarimetry at the end of the last century, which merges with Doppler measurements and forms Doppler polarimetry, gives new possibilities in obtaining deeper and multifarious information about the characteristics and dynamics of the meteorological objects under the study. These possibilities are provided by the multiparametric approach and implemented by measuring a set of information parameters. The polarization diversity in modern meteorological radars is used mostly for microstructure identification. However, in some papers [3], [4], polarization is proposed to be used for detection of dynamic atmospheric phenomena such as tornados or severe turbulence. In these papers, information about dynamic phenomena is associated with polarization via indirect polarization signatures, like the relationship of heavy rain, thunderstorms, and turbulence with the presence of large nonspherical drops. In addition, some difficulties arise in depicting the polarization of the electromagnetic wave reflected from a distributed target that is typical for clouds and precipitation, which consist of a large number of different scatterers distributed in a large volume. These scatterers change the polarization of the incidence wave in different ways depending on their phase state, shape, and size, among other factors. Therefore, the reflected signal contains information that is averaged over a volume. The modern polarimetric and Doppler-polarimetric radars operate with data that are averaged over time as well. A significant portion of information that can help in understanding the microstructure, behavior of the meteorological formation, and atmospheric processes that affect the object under study is lost. In addition, promising multiparameter techniques can complicate the data processing and information interpretation significantly. Therefore, it is reasonable to develop radar methods that take into account different characteristics of the reflected electromagnetic wave and operate with initial (primary) parameters.

The dominant opinion has long been that polarimetry (without Doppler effect) is not sensitive to wind phenomena. However, analysis of drop behavior [5], [6] shows that the liquid hydrometeors change their shape and orientation under external influence. It is possible to see from the statistical data given in [7] that weather objects composed of a collection of water droplets vibrate constantly. Therefore, the collection of liquid hydrometeors can be considered objects with an unstable shape. The changes of drop shape, drop vibrations, and drop orientations contain important information about the reflecting object behavior, characteristics, and structure. The character of such changes can be provided by the characteristics of the object, their interaction with the medium, and the influence of dynamic phenomena like wind and turbulence on the unstable-shape objects. Thus, it

Authors' current address: National Aviation University, Electronics, Komarova, 1, Kiev, 03680 Ukraine, E-mail: ayua@nau.edu.ua.
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Conclusion

- National Aviation University is a prominent and internationally recognized institution in the field of Electronic Systems, Radar and Remote Sensing of the Atmosphere.
- My best wishes to the participants of 6th World Aviation Congress.
- Welcome to MRRS Symposium !!!