

RACE FOR A HIGHER QUALITY OF THE SCIENTIFIC INFORMATION: A 60 YEARS (1957-2017) RETROSPECT OF THE MAIN PERSONAL CONCERNS AND STUDIES II. YEARS (FALL 1992 - 2017) OF ACTIVITY SYNTHESIS

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This work presents a brief review of the main results obtained by author during the years 1992-2017, in the field of Information Science, in cooperation with: a) the Departments of: (i) Physics of the Politecnico di Torino (concerning mainly the numerical phenomena intervening in the complex simulations on computers), (ii) Physics of the Portland State University from Oregon (relative to the information technologies based on the intelligent devices – CCDs), (iii) Information Science and Physics, respectively, of the University “Politehnica” of Bucharest (teaching of several Master courses in the field of the Information Science), b) section of Information Science and Technology of the Academy of Romanian Scientists. Finally, this paper presents a synthesis of the author’s main scientific and didactic results obtained during his 60 years of activity (1957-2017).

Key words: Information Science, Complexity Theory, Syntactic Structures

6. Fall 1992 - Spring 2001: First International scientific apprenticeship at Prof. Delsanto’s research group from Dipartimento di Fisica, Politecnico di Torino; Battle (Fight) for a higher accuracy of Computer Simulations

The advantages of the computer simulations of some intricate physical materials or processes are well-known [1], but ... given being it is generally required a high accuracy of the scientific information, the computer simulations have to lead also to very accurate results. Or, when I began my apprenticeship in the frame of Professor Delsanto’s research group, besides many other scientific goals, the fellows of this research group were concerned by certain distortions affecting the Finite Differences (FD) simulations both of the: a) diffusion and drift processes [2] (see e.g. figs. 1 and 2, as well as the reference [23a] of the first part of this work), and those of the: b) waves propagation in various media³ (ref. [23b] of the first part of this work): as the instabilities – fig. 3, the pseudo-convergence – fig. 4 and the opposite distortion following immediately the simulated pulse [3] (see also fig. 5). Together with Prof. Delsanto and his main Italian collaborators – Drs. Marco Scalerandi, Giorgios Kaniadakis and Enrica Ruffino, we (myself and dr. Eng. Cristina Iordache) succeeded to explain [4], [5] and [6] the numerical phenomena presented by Figs. 1, 2, 3 and 4.

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³These simulations were intended to different applications in the field of non-destructive examinations and testing (NDE/NDT).

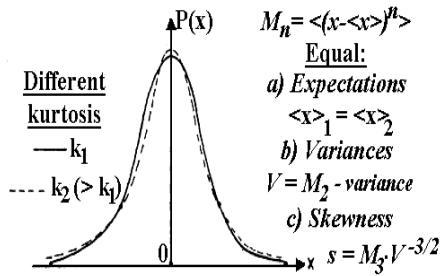


Fig. 1. Plots of probability density functions for diffusion simulations of different kurtosis,.

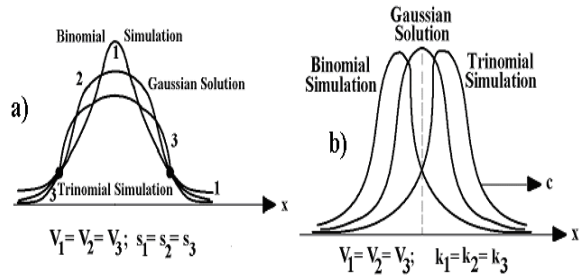


Fig. 2. Comparisons of binomial, trinomial and Gaussian simulations, for equal variances, but different: a) kurtosis, b) skewness [1], p. 105.

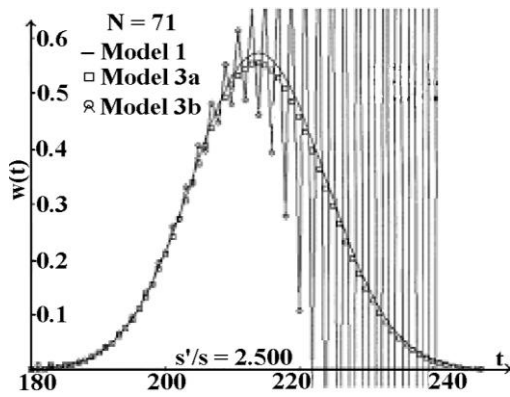


Fig. 3. Instabilities affecting some FD simulations of the pulse propagation in various media pulse.

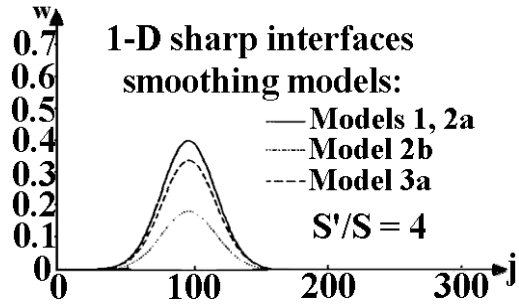


Fig. 4. Pseudo-convergence relative to the true shape (for simulation models 1 and 2a).

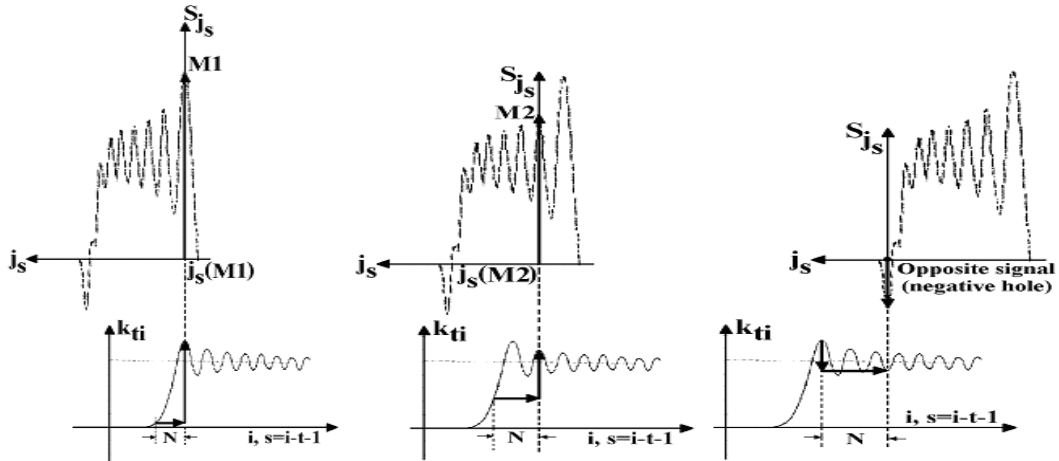


Fig. 5. Graphical explanation of the “opposite” distortions appearance following the simulated propagated rectangular pulse, $s_{j_s} = (2 - \sqrt{c})(k_{t,t(1-\sqrt{c})+j_s} - k_{t,t(1-\sqrt{c})+j_s-N}) \equiv (2 - \sqrt{c})(k_{t,i} - k_{t,i-N})$ where $j_s \in \{1, 2, \dots, N, \dots\}$ = index of the simulated pulse component, beginning from the first front one, and N = number of components, k_{ti} = transfer coefficient, \sqrt{c} = Courant number [1] p. 60-68.

Taking into account that my main personal contributions correspond to the explanation of the opposite distortion following the simulated pulse (fig. 5.), as well as the structure of the field of FD simulations of pulses propagation (fig. 6.), it is not at all surprising that my specialty in the field of Computer simulations became that of Numerical Phenomena (call “Numerical Phenomena” on the computer accounts, as that of Google, particularly).

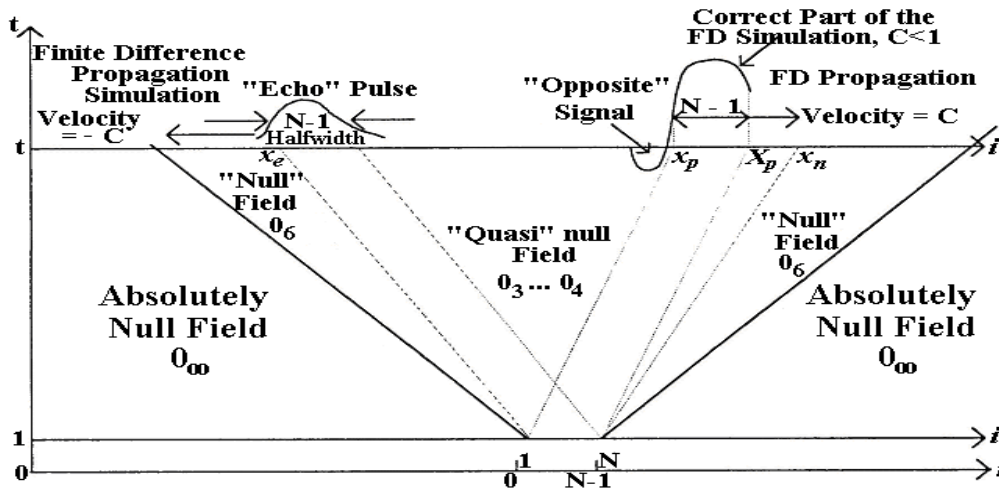


Fig. 6. Structure of the FD simulation field of the propagation of pulses of different shapes.

The expressions of the main limits are:

$$x_e = -Ct - 2\sqrt[3]{t}, \quad x_p = 1 + C(t-1), \quad X_p = N + C(t-1), \quad x_n = Ct + N + 2\sqrt[3]{t} \quad [1], \text{ p. 59.}$$

In following, I coordinated the activities of the: a) 4 Romanian institutions (“Politehnica” University of Bucharest (i), Institute for Solid Mechanics of the Romanian Academy [coordinated by Prof. dr. Veturia Chiroiu] (ii), University “Transilvania” from Braşov [coordinated by Prof. dr. Nicolae Creţu] (iii) and the Research Institute for Aviation Materials [coordinator – Dr. Eng. Cristian Berar] (iv)) in the frame of the Copernicus project CIPA CT 94 (1994-1998, under the overall coordination of Prof. P. P. Delsanto) “Numerical Simulation and Mathematical Modeling of the Ultrasound Propagation through Structural Materials”, and of the: b) “University” Politehnica of Bucharest, in the frame of the NATO PST.CLG.976864 “Theoretical Modeling and Experimental Implementation of Nonlinear Acoustic Techniques for Micro- Scale Damage Diagnostics” (2000-2002, overall coordination Prof. Delsanto, the coordination of the Romanian activities being ensured by Prof. dr. Veturia Chiroiu).

In October 1999 – together with prof. A. Lupaşcu, assist. prof. Vladimir Iancu and dr. Ioan Pop, I presented the works: (i) Device for the evaluation of the low frequency parameters of the soft magnetic materials, and: (ii) Segment of hyperconductor cryogenic cable, at the 3rd national Conference on New Devices, Technologies and Inventions PROINVENT’99.

I have to mention also that during the years 1994-2000 I accomplished also some studies certain numerical simulations of certain physical processes: (i) diffusion, (ii) conduction, (iii) magnetic, ferroelectric and elastic hysteresis, respectively, (iv) solitary waves propagation, (v) ligands-proteins reactions [7], (vi) calcium ions kinetics through some membranes channels, etc., by means of some monthly grants awarded in the frame of the program Training and Research in Italian Laboratories (TRIL) [directed by Prof. Giuseppe Furlan] of the International Center for Theoretical Physics (ICTP) – Trieste, Italy.

The last above mentioned research directions led me to the Laboratory of Professor Jonathan Abramson, from the Portland State University (PSU), for the study of phase transitions and temperature dependence of the Ryanodine binding rate [8 a,b], especially.

7. Fall 2000 – Spring 2011

7.1. Second apprenticeship – now in the frame of Physics Department of Portland State University

During my scientific activities in the frame of Prof. Abramson's research group, I met Prof. Erik Bodegom [head of PSU Physics Dept. and President of the Sciences Academy of the Oregon state (2002-2004)] and his young, but outstanding collaborator – Prof. Ralf Widenhorn. Given being they studied some intelligent devices (the so-called Charge Coupled Devices) of high interest in the information technology [9], I begun immediately to examine carefully their last (then) publication [9b] on this topic. Finding it as extremely interesting, as well as the later Prof. Widenhorn synthesis on CCDs [10a] (see also the monograph [10b], due to the kindness of Professor Bodegom), I begun to study the numerical analysis of the corresponding experimental data [9c].

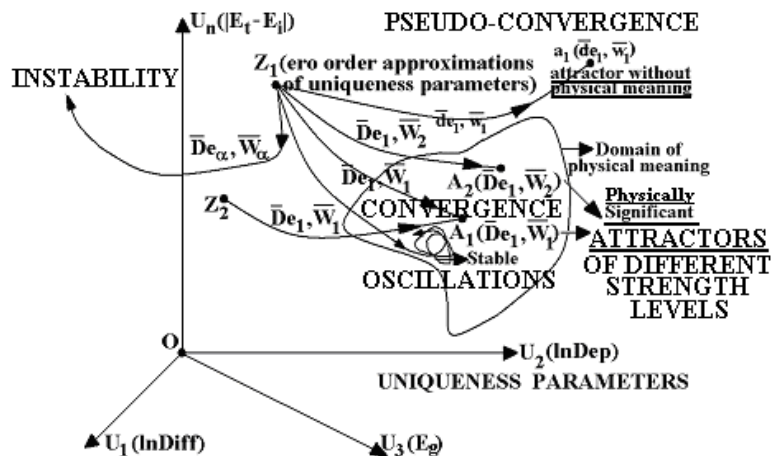


Fig. 7. Main types of numerical phenomena met in the evaluation of the uniqueness parameters by the gradient method.

Besides the found common results concerning the characterization of the semiconductor materials of the studied CCDs [11], this numerical analysis led later me and my collaborators [12] to the identification of the main numerical phenomena (see Fig. 7) met during the evaluation of the uniqueness parameters, as well as to the evaluation of the attractors strength¹ (see [12] and Table 4).

Table 4

Final results concerning the values of the uniqueness parameters E_g , $\ln Diff$, $\ln Dep$ and $|E_t - E_i|$ by means of the classical gradient method (for the experimental data see [9b] and [11c])

Coordinates of the pixel	0-order E_g Approximation m	$E_{g,eff}$ (eV)	$\ln Diff$	$\ln Dep$	$ E_t - E_i $, meV	Numerical phenomenon & Attractor
61, 140	-10	0.580869*	9.402933*	39.026176*	381.94396*	Pseudo-convergence
	-8	0.564653*	8.573753*	40.444841*	414.60294*	
	-6	1.072556	31.079047	17.52459	28.92168	Very strong attractor
	-4	1.072556	31.079047	17.52459	28.92168	
	-2	1.072556	31.079047	17.52459	28.92168	
	0	1.072556	31.079047	17.52459	28.92168	
	2	1.072556	31.079047	17.52459	28.92168	
	4	1.072556	31.079047	17.52459	28.92168	
	6; 8 & 10	Instability starting from iteration 4 ($m = 6$) and 2 ($m = 8$ and 10), respectively				
121, 200	-10	1.067221	30.865956	15.540974	13.31129	Weak attractor; additionally, medium amplitude oscillations
	-8	1.067238	30.866604	15.567840	12.93887	
	-6	1.067272	30.867992	15.659601	13.543185	
	-4	1.067263	30.867633	15.630247	13.350595	
	-2	1.067251	30.867136	15.596534	13.128485	
	0	1.067257	30.867372	15.611681	13.22839	
	2	1.067259	30.867458	15.617526	13.2669	
	4; 6; 8; 10	Instability starting from iteration 4 ($m = 4$) and 2 ($m = 6; 8$ and 10), respectively				

¹Given being that the usual single precision corresponds to 7 decimal places (for a 32-bit word machine), it is possible to define the *strength levels of an attractor relative to a certain uniqueness parameter* by means of the number of common first decimals for several neighbor zero-order approximations: 7 common first decimals (VS), 6 (S), 5 (MS), 4 (M), 3 (MW), 2 (W), 1 (VW), 0 but a certain weak convergence (VVW). Of course, *the general attractor's strength level* will be its strength level relative to the weakest studied uniqueness parameters (e.g. $|E_t - E_i|$ for CCDs).

7.2. Organization of some International scientific Conferences

Between the years 2000 and 2008, there were organized 6 international scientific Conferences, namely those of:

a) Numerical Physics (October 30-31, 2000, Bucharest), with the strong cooperation of Professors Cristian Florea (École Supérieure d'Ingénieurs en Électrotechnique et Électronique, Noisy, Paris) et Constantin Udriște, involving the contributions of Professors: C. Udriște (Discrete geometric dynamics), D. Iordache (Numerical Physics), C. Florea (Temps de vie radiatif d'un niveau quantique), D. Ioan and M. Rebican (H-B histeresis model), Ș. Georgescu (Erbium lasers), V. Balan (Lorentz-type equations) [16a].

b) Mathematics in Engineering and Numerical Physics (MENP-2, April 22-27, 2002, the same organizing Committee). The Numerical Physics part involved the sections: 3. Numerical Physics, 4. Physics Models in Engineering, 5. Technical Models in Engineering [16b]. Among the communicated works, we can cite those of Professor J. Abramson, S. Müllen (Ryanodine), E. Bodegom, R. Widenhor (CCDs) – USA, S. Barbu, C. Ripoll, G. Baudouin (Communications aux haute fréquences), C. Florea, M. Villegas, J.-L. Pollueux, Ș. Georgescu (3 works on electronic lasers) – France, A. Podoleanu, J. A. Rogers, D. A. Jackson, R. B. Rosen (Optical coherence tomography) – U.K., P. P. Delsanto, M. Scalerandi, V. Chiroiu, L. Munteanu (Meso-scopic structures) – Italy, Claudio Pecorari (US waves) – Sweden, totally 30 communicated works. There were so 6 works of French authors, 2 works elaborated by American and 2 works of Italian authors, 1 work due to a British scientific team and another 1 of a Swedish author, the other 20 works belonging to Romanian authors: 4 works of Professors of Bucharest Physics faculty, 2 works elaborated by researchers of the Solid Mechanics Institute of the Romanian Academy, and 2 works of Professors of the Control Systems Dept. of UPB, 1 work of researchers from the Institute of Atomic Physics-Măgurele, and 1 work elaborated by Professors of UPB Electronics faculty. The remaining 8 communications were presented by Professors of our Physics Department.

c) Mathematics in Engineering and Numerical Physics (MENP-3, October 7-9, 2004, the same organizing Committee). The Numerical Physics part involved the sections: 3) Numerical Physics, 4) Intelligent Control of Vibrations (coordinated by the Institute of Solid Mechanics, mainly by Dr. Veturia Chiroiu), 5) Computer Aided Physics Education and 6) Modeling in Engineering.

The number of scientific communications for these 4 sections reached (at the 3rd edition) a maximum of about 80 works [16c], their management becoming difficult (for the section of Numerical Physics, especially) due to the limited number of our organizing Secretariat (between 3 and 5, corresponding to

the rather small number of our research group). For this reason, the number of accepted works at the following 3 editions was limited to (no more than) 40 works. Besides the previously indicated participating countries, to this edition participated additionally some scientists from the Czech Republic, Argentine (by correspondence), Greece, Belarus, Moldova Republic (professors Iulia Malcoci, N. Balmuş, etc), from the Romanian academic centers of Cluj, Iaşi, Timișoara, Braşov, Constanța, Suceava, and some of the best high-schools professors. We have to mention also that the number of presented works at the new sections were: 4) Intelligent Control of Vibrations (coordinated by Prof. PhD Veturia Chiroiu, from the Institute of Solids Mechanics of the Romanian Academy, with participation of acad. Tudor Sireteanu, prof. Marcel Migdalovici, etc) – 9 scientific works, 5) Computer Aided Physics Education – other 9 works, 6) Modeling in Engineering – 18 scientific works.

d) Mathematics in Engineering and Numerical Physics (MENP-4, October 6-8, 2006, the same organizing Committee). The Numerical Physics & Complexity part involved the sections: 3) Numerical Physics and Complexity – 18 works, 4) Modeling in Applied Physics – 10 works, 5) Intelligent Control of Vibrations (coordinated by by Dr. Veturia Chiroiu) – 3 works, and 6) Computer Aided Physics Learning – 6 works. The new participating countries were Bulgaria (represented by Prof. N. Popdimitrova) and Albania (professors Niko and Genci Gjanci, Univ. “Fan S. Noli”, Korce) [16d].

e) Mathematics in Engineering and Numerical Physics (MENP-5), joint with the First Colloquium on “Physics of Materials” (MP-1) [October 9-11, 2008, with Professors Doina Mănăilă-Maximean (Phys. Dept. UPB) and Lidia Magdalena Ciurea (Romania Institute for Physics of Materials) as main organizers of the PM-1 Colloquium]. There were presented 59 communications, 22 with a clear Physics of Materials content, 25 with a Numerical Physics content, while the remaining 12 works had a mixed character. The participation on countries and on Romanian research Institutes and Universities, respectively, was similar to those of the previous two MENP Colloquia (see also tables 1 and 2 [16e]: totally 15 participant countries and 25 participant Romanian institutions).

While the organization of the Numerical Physics Colloquia was interrupted after this edition, that of the Physics of Materials continued and reached its 5th edition in 2016.

8. Didactic activities between Fall 1992 – Spring 2011

8.1. Elaboration of academic textbooks

At its exit from the partial (1946-1968), then complete international scientific isolation (1968-1989), Romania and particularly its largest academic institution - the Polytechnic Institute of Bucharest had to be reintroduced in the frame of the international institutions. Given being Acad. Remus Răduleş (1904-1984) and

his PhD students, later also Academicians – Alexandru Timotin (1925-2007) and Andrei Țugulea (b. 1928) remained among the very few Romanian scientists with significant scientific international contributions during this isolation period [13], it is not at all surprising that while Acad. Țugulea led the transition of our scientific activities (see §5.2), Acad. Alexandru Timotin founded the Department of Engineering Sciences (in foreign languages: English, German and French) in the frame of the Polytechnic Institute of Bucharest.

I participated also to this important didactic effort, teaching – beginning from 1991 up to 2009 (the year of my didactic retirement) – the Physics lectures for the students of the English and French streams.

As a result of my didactic activities, I elaborated firstly the academic textbooks intended to English stream [14], and later those corresponding to the French stream [15].

A new stage of my activities intended to the elaboration of academic textbooks in foreign languages begun during my cooperation with the professors of the Portland State University (Oregon, USA).

In the frame of these collaborations, there were elaborated both the 2 volumes [17a, b] of the academic Physics textbook intended to the students of the Technical Universities, as well as the Computational Physics guide [17c], written in cooperation by the Professors of PSU (3 co-authors), Politecnico di Torino (2 co-authors) and of our University (3 other co-authors).

8.2. Activities of Students' initiation in scientific research and of preparation for Physics professional contests

Given being the multitude of aspects in these activities, usually very well appreciated by the students, we will synthesize some of their main features by means of Table 5, some explanations being presented in the frame of the below footnote¹.

¹a) Between the years 1994-2001, the interest of UPB students for Physics professional contests diminished drastically in favor of the “explosive” increase of their interest for the initiation activities in the Physics scientific research. Subsequently, the number of Physics sections at the UPB sessions of scientific research increased from 1-2 sections (around of 10 works and 20 participant students in the years 1990-1993 to 3-4 sections (more than 40 works and 70 participant students around of the year 2005). As some students told me later, the students' interest for Physics research was related to their desire to improve their scientific logic (eng. Scumpu) and their theoretical abilities. b) While between 1994-1999, the large majority of high-school students participant to national and international scientific Olympiads opted to accomplish their academic studies in the frame of Sciences and Medicine faculties, beginning from 2000 it was found the return of their interest for technical Universities, which determined also a certain re-launch of the Physics students' contests.

Table 5

<i>Year</i>	<i>Students' initiation in scientific research Numbers of participant students/works</i>	<i>Physics professional contests (number of participants/ name of winners)</i>
1993	14 students/ 7 scientific works	12/ PI: Cristian DIMA – A&C P3: Rodica DECIU – Fac. Eng. For. Lang.
1996	3 students/ 1 scientific work	-
1997	8 students/ 4 scientific works – fac. A & C 6 students/ 2 scientific works – fac. FEFL	-
1998	14 students/ 6 scientific works – fac. A & C 12 students/ 3 scientific works – fac. FEFL	-
1999	35 students/ 10 scientific works – faculties A&C, FEFL, Electronics	-
2000	29 students/ 11 scientific works – faculties A&C, FEFL, Electronics	-
2002	95 students/ 33 scientific works – fac. A&C (Florin POP, 2 nd ac. yr.), FEFL	17/ PI: Bogdan MĂLĂESCU – A&C 7/ P2: Andreea VUȚĂ – FEFL
2003	? (<i>unidentified probable works</i>)	16/ PI: Florian MIHAI, 1 st ac. yr – A&C 6/ P3:D.DORNEANU,M.IACOB-FEFL
2004	<u>Physics</u> : 15/6 Applied, 79/26 Modern Alexei DODON; 47/17 Numerical (Florin POP); 97/26 Technical	15/ PI: Florian MIHAI, 2 nd ac. yr -A&C 21/ P1:Bogd.PRISĂCARI,1 st ac.yr.A&C
2005	<u>Physics</u> : 25/12 Applied, 22/9 Modern; 56/19 Numerical ¹ (Fl. POP&R. TĂTĂROIU)	10/ PI:Răzv.TĂTĂROIU, 2 nd ac.yr A&C 9/ P1: Ștefan BUCUR,1 st ac.yr.A&C
2006	Numerical Physics 42/17 & Decebal High-school from Bucharest 10/3	The author of this paper had some research activities at Portland State University, OR
2007	Numerical Physics & Complexity; A&C – FEFL - 55/23 January; 23/22 May	7/ P1: Otilia ANTON, 2 nd yr. FEFL
2008	Numerical Physics & Complexity; A&C – FEFL - 55/23 January; 23/22 May (Răzvan-C. IONESCU A&C, Sergiu COSMESCU, FEFL)	3/ P1: Răzvan CIOC, 2 nd yr. FEFL
2009	Numerical Physics & Complexity; A&C – FEFL - 32/19 January	<i>(author's retirement)</i>

These results were obtained in strong cooperation with professors Radu Dobrescu (Control Systems Dept.), Doina Gavrilă, Radu Chișleag, Laurențiu Fara, Vasile Popescu, Constantin Roșu, associated professors Mircea Stan, Luminița Daniello, Liliana Burileanu, Daniela Buzatu, Petru Valeriu (Comp. Dept.), assist. prof. Iulian Bădrăgan, assist. prof. Eng. Florin Pop, and the regretted researchers dr. Tatiana Pop and dr. Mihaela Bugeanu² and others.

¹The large majority of the students-authors participated previously to the Romanian (national) and to the international Physics Olympiads from 2003 and 2004, being winners of IPhO prizes.

²For more information see the synthesis [14].

9. Fall 2006 – Spring 2011: Activities of Master studies leadership in the framework of UPB Departments directed by Professors Radu Dobrescu and Paul Sterian, respectively

Between the Fall of 2006 and the Spring of 2011, inclusively, I had a very fruitful cooperation with Professor Radu Dobrescu (then Director of the Information Science of “Politehnica” University from Bucharest) in the directions of:

a) development and teaching of my Master course “Applications of the modern Physics for the Complex systems modeling”, including the leadership of several Master (hence already engineers in the Control Systems specialty) students’ works of initiation in the scientific research, many of them awarded with prizes and merit mentions of the University “Politehnica” of Bucharest,

b) Elaboration (as unique author of 287 pages, from the total of 519 pages, and general editor – together with Prof. Radu Dobrescu, initiator of this treatise) of the scientific monograph “Complexity Modeling” (in Romanian), printed in 2007 by the publishing house “Politehnica Press” (Bucharest), and awarded on March 11, 2010, by the Academy of Romanian Scientists with the “Ștefan Odobleja” prize (in the specialty of Information science),

c) Elaboration (in strong cooperation with Professor Radu Dobrescu, the initiator of this treatise) of the scientific book “Complexity and Information” (540 pages), published in 2010 by the Printing House of the Romanian Academy, and awarded in December 13, 2012, with the “Grigore Moisil” prize of the Romanian Academy.

Between the Fall of 2008 and the Spring of 2012, I had also important and very interesting scientific and didactic activities in the frame of the Master program “Photonics and Advanced Materials”, coordinated by Professor Paul E. Sterian, involving:

a) the development and teaching of my course “Numerical Methods in Optical Engineering”, including also the leadership of several Master (hence already Physics or Chemistry professors, or engineers in different specialties) students’ works of initiation in the scientific research, many of them awarded with prizes and merit mentions of the University “Politehnica” of Bucharest,

b) Elaboration - in strong cooperation with the American professors Erik Bodegom, Ralf Widenhorn (16 pages), David McClure (22 pages), the Italian professor Pier Paolo Delsanto (22 pages) and the Dr. Antonio S. Gliozzi (3 pages), as well as of the Romanian professors Constantin Roșu (21 pages), Florin Pop (22 pages), the remaining 243 pages representing my own contribution - of the first volume “Basic notions” of the international scientific and didactic course “Computational Physics Guide”, published (in English) by the Printing house “Politehnica Press” (Bucharest) in 2009,

c) Elaboration (as unique author of its 277 pages) of the scientific and didactic monograph “Numerical Methods in Optical Engineering” (in Romanian), printed in 2010 by the publishing house “Politehnica Press” (Bucharest),

10. July 2011 – today: Activities as Honorary Member of the Academy of Romanian Scientists (AOSR)

According to the address 693/28.07.2011 of the AOSR leadership I was confirmed on July 20, 2011, in the frame of the AOSR leadership, as honorary member of the Academy of Romanian Scientists. According to this nomination, I work in this quality in the frame of the section of “Information Science and Technologies” of AOSR, lead by Emeritus Academic Professor Paul E. Sterian.

To avoid a too long list of published works in this period, I’ll mention only:
a) the works elaborated in cooperation with Professor Paul E. Sterian – coordinator of the section of Information Science and Technologies [18],

b) the works elaborated recently in cooperation with other members of the AOSR-Section of Information Science and Technologies [19],

c) my works published in 2016 [20],

d) some of my works elaborated in this period and intended to the scientific preparation of some PhD students [11d], [12], [21].

Conclusions

Table 6

<i>No.</i>	<i>Studied scientific field</i>	<i>Total number of published works</i>	<i>Published works as unique author (from previous total number)</i>
1	Computer-aided scientific Studies, Complexity and Information Theory	101	24
2	Mechanics and Acoustics	41	1
3	Magnetic materials and devices	38 (6 works on devices)	1
4	Cryogenics	19	2
5	Medical studies	19	1
6	Dielectrics	19	1
7	Semiconductors	16	-
8	Optics and Spectroscopy	12	3
9	Physics Education	10	3
10	Theoretical and Applied Thermodynamics	5	1
	ALL STUDIED SCIENTIFIC FIELDS	280	37 (13.2 %)

A synthesis of my published scientific works corresponding to the studied scientific fields is presented in the frame of table 6.

A brief synthesis of all essential results obtained in the domain of the Information Science is reported by table 7.

Table 7

Year/ Age of Author	Priority in Romania	Paper or public communication	Implications	
			In Romania	On international plan
1960/ 20 years and 9 months	Scientific Informa- tion Quality	Physics faculty Bachelor Thesis "Continuous X radiation", under direction of Acad. Șerban Țițeica	First (from 2 professors) summoned by the Education Ministry to elaborate Physics problems intended to the unified admission in all Romanian Universities, 1978	a) Most accepted sub- jects (1.5 from 4) at IPhO – 1983; b) scienti- fic leader of IPhO Ro- manian team ¹ , c) selec- tioner Romanian teams
1967/ 27 years and 6 months	Identifica- tion of some power laws and phase transitions in complex materials	D. Iordache "L'étude de la courbe dynamique d'aimantation d'un ferrite mixte Mn- Zn, de haute perméabilité", Bull. Polytechn. Inst. Bucharest, 29 (3) 25-41(1967).	Acceptance by the Romanian Education Ministry, multiplication and distribution of 500 copies of the device for magnetic measurements, 1978	Nomination as one of the approx. 1000 proposers from the whole world for the Physics Nobel prize award for the year 1992.
1973/ 34 years	Definition and use of compatibi- lity coeff. of theoret- ical rela- tion vs. the experiment	D. Iordache "On the Use of the $J(^{13}\text{C-H})$ indirect Spin-Spin Coupling Constants for the Deter-mination of some Structural Molecular Parameters", <i>Rev. Roum. Phys.</i> , 18 (10) 1165- 70(1973).	Homologation (acceptance) by the Education Ministry of the Informatics product intended to the Experimental Data Processing, 1986	Poul-Erik Hansen "C-H Spin-Spin Coupling Constants", <i>Progress in NMR Spectroscopy</i> , vol. 14, pp. 175-296(1981), at page 189: "The need to restrict co-relations to homogeneous groups and to use a rigorous mathematical procedure were stressed by <u>Iordache</u> "
1975/ 36 years	Complete scheme of the scientific terminology in Physics starting from information	D. Iordache "General Notions and Methods of Physics", <i>Physics Lectures</i> , vol. 1 (1975), vol. 2 (1980), Polytechnic Institute of Bucharest	R. Dobrescu, D. A. Iordache "Complexity and Informa- tion", Romanian Academy Printing House, Bucharest, 2010, 540 pages ("Grigore Moisil" prize of the Romanian Academy)	The only one Romania representant in section of Universities (Physics faculties, Technical Universities, etc) of the Division for the Physics Education of the European Physical Society (2001-2009, up

¹ Scientific selection and leadership of the Romanian teams at IPhO's from 1988 (first world place) - 1990, 1995, 1996 (second world place), and the Physics Balkaniads from 1986, 1987 (both first place), 3) Main participant to the selection of Romanian teams for the IPhO's from 1986 (second world place), 1987 (first world place), 1991-1994, 1997.

				to retirement)
1984/ 45 years	Applications of Physics scientific terminology, starting from information sets	Chap. 1 "General notions and methods of Physics", in I. M. Popescu, <u>D. Iordache</u> , et al. "Solved Physics Problems", vol. 1, Technical Printing House, Bucharest, 1984, 520 p.	Author of pages 21-257 and 332-382 ("Ștefan Odobleja" prize of Romanian Science Academy), in the frame of R. Dobrescu, D. Iordache, et al. "Complexity Modeling", Politehnica Press, Bucharest, 2007.	11 years (2000-2011) of continuous scientific cooperation with some professors of Phys. Dept., Portland State University, Oregon, USA → numerous common sci. works
1997/ 57 years	<u>Numerical Phenomena</u> in the computer simulations of complex systems	D. Iordache, P. P. Delsanto, M. Scalerandi "Pulse Distortions in FD Simulations of Elastic Wave Propagation", Math. Comp. Modelling, 25 (6) 31-43 (1997).	D. A. Iordache "Contributions to the Study of Numerical Phenomena intervening in the Computer Simulations of some Physical Processes", Credis Printing House, Bucharest, 2004, 118 pages.	1) Numerous citations in the specialty literature & Google "Numerical Phenomena" 2) 10 years (1992-2001) of scientific co-operation with Dipart. di Fisica, Politecnico di Torino
2009/ 70 years	Information of technical interest obtained by means of the charge coupled devices (CCD)	R. Widenhorn, E. Bo-degom, D. Iordache, Vl. Iancu "Study of the temperature dependence of dark current non-uniformity for some video-camera chips", Proc. 32 nd International Semiconductor Conf. CAS-2009, October 12-14, 2009, Sinaia, Romania, vol. 2, pp. 463-466, IEEE Catalogue no. CFP09CAS.	D. Iordache "Numerical Methods in the Optical Engineering – Applications in the modern (complex) technologies from the Optical Communications" (in Romanian), Politehnica Press, Bucharest, 2010, 277 pages	D. A. Iordache, P. Sterian, I. Tunaru "Charge Coupled Devices –CCD as Particle Detectors", <i>Hindawi Publishing Corporation, Adv. High Energy Physics</i> , vol. 2013, ID425746, 12 pg
2015- 2017/ 76- 78 years	Annotated Romanian translations of 3 outstanding books in the field of Information	a) Autobiography of the Great American Inventor R. G. LeTourneau; b) W. Gitt "At beginning was information"; c) D. R. Faulkner "The Universe by Design"		

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While the learning periods, under the leadership of certain professors was limited to some activity stages, the cooperation begun with some of my colleagues in a certain stage of my activity continued usually during several decennia.

Table 8

<i>Activity Stage</i>	<i>Main Didactic and Scientific Leaders</i>	<i>Main Collaborating Colleagues</i>
Highschool (1952-1955)	Prof. V. Neacșu (for his very difficult maths home tasks)	Octavian Stănășilă, George Galațchi (GG) (later Maths academic professor, Maths and – resp. - Phys doctors)
Physics academic studies (1955-1960)	Prof. dr. D. Bârcă-Gălățeanu; Acad. Șerban Țițeica, Prof. dr. phys. Mihai Gavrilă	Ioana Voinea-Stanciu (magnetism) Aretia Teodorescu (didactic tasks)
Industry activities (1960-1965)	Prof. dr. eng. Vasile M. Cătuneanu; Dr. eng. V. Tannach, Dr. eng. J. Neuberger	Chem. eng. Octaviana Croitoru-Taraza; Electr. eng. Marlene Bicalis-Marinescu Dr. phys. George Galațki
Doctorate studies; first academic activities (1966-71)	Prof. dr. doc. D. Bârcă-Gălățeanu; Acad. Margareta Giurgea	Prof. phys. dr. Doina Gavrilă Prof. dr. eng. Adrian Rusu (later corresp. member of the Romanian Academy)
Didactic and scientific activities (1971-1992)	Prof. dr. eng. Ion M. Popescu (all activities); Prof. dr. eng. Vasile Cătuneanu (admissions)	Prof. drs. Constantin Cristescu, Paul E. Sterian (academic admissions); Prof. R. Pop & Ștefan Levai (pupils' Olympiads)
Computational Apprenticeship Poli. Torino (1992-2001)	Prof. dr. Pier Paolo Delsanto	Dr. Marco Scalerandi; Dr. Enrica Ruffino; Dr. Valentina Agostini Dr. Giorgios Kaniadakis
Copernicus CIPA CT-94-0132 (1994-1998)	Prof. dr. Pier Paolo Delsanto (overall) Prof. Aurelia Stepanesco (organizing part)	Prof. Miroslav Doložilek (Brno U.) Prof. Veturia Chiroiu (IMS-AR) Prof. Nicolae Crețu (Univ. Brașov)
2 nd Apprenticeship: Portland State Univ. Fall 2001- Spr. 2011	Prof. Jonathan J. Abramson Prof. Erik Bodegom Prof. Ralf Widenhorn	Prof. David McClure Dr. B. Marinov, Dr. S. Müllen
First Master Cooperation (fall 2006-Spring 2011)	Prof. Radu Dobrescu (also the initiator and main collaborator to monographs on Complexity & Information, awarded with the prizes of the Romanian Sciences Academy and of the	Dr. Eng. Loretta Ichim (co-editor of the materials intended to the monograph on the Modeling of Complexity)

	Romanian Academy)	
Second Master Activities (fall of 2007 – Spring 2011) and Activities in the frame of the Academy of Romanian Scientists (Spring 2011-...)	Emeritus Professor Paul E. Sterian, coordinator of the section of Information Science and Technologies	Prof. dr. eng. Radu N. Dobrescu

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