

CURRICULUM VITAE OF PANDO G. GEORGIEV

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Name: Pando Grigorov GEORGIEV

Current position:

Visiting Scholar

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Degrees:

- D.Sci. in Mathematics, July 2001, Sofia University “St. Kl. Ohridski”, Faculty of Mathematics and Informatics
- Ph.D. in Mathematics, January 1987, Sofia University “St. Kl. Ohridski”, Faculty of Mathematics and Informatics (Supervisor: Acad. P. Kenderov).
- Master of Mathematics, July 1982, Sofia University “St. Kl. Ohridski”, Faculty of Mathematics and Informatics, (Supervisor: Acad. P. Kenderov).

Faculty and research positions:

- Visiting Scholar, ECECS (Electrical & Computer Engineering and Computer Science) Department, University of Cincinnati ML 0030, Cincinnati, Ohio 45221-0030 (August 2004 – present)
- Research Scientist, Laboratory for Advanced Brain Signal Processing, Brain Science Institute, The Institute of Physical and Chemical Research (RIKEN), Wako-shi, 2-1 Hirosawa, Saitama 351-0198, Japan (October 2000 – July 2004).
- Visiting Professor, Hirosaki University, Department of Mathematical System Science, Japan (November 1999 – August 2000).
- Associate Professor, Sofia University “St. Kl. Ohridski”, Faculty of Mathematics and Informatics, Department of Probability, Operations Research and Statistics (Dec. 1994 - Oct. 2000).
- Assistant Professor, Sofia University “St. Kl. Ohridski”, Faculty of Mathematics and Informatics, Department of Operations Research (February 1989 – December 1994).
- Assistant Professor, University of Architecture and Civil Engineering, Sofia, Bulgaria (July 1987 – February 1989).
- Mathematician, Laboratory for Applied Mathematics, Bulgarian Academy of Sciences, Plovdiv, Bulgaria (July 1986 – July 1987).

Teaching experience (in reverse chronological order):

- in ECECS Department, University of Cincinnati: *Statistical learning theory – kernel methods for pattern analysis*, lectures for graduate students.
- in the Faculty of Mathematics and Informatics, Sofia University "St. Kl. Ohridski", Bulgaria:
 - Main course on *Optimization* for undergraduate students, part I and part II, delivered 5 years;
 - *Numerical Methods and Optimization*, lectures undergraduate students, delivered 2 years;
 - *Applied Nonlinear Analysis*, lectures for graduate students, delivered 3 years;
 - *Optimality and Equilibrium*, lectures for graduate students, delivered 3 years;
 - *Optimal Control and Calculus of Variations*, lectures for graduate students, delivered 2 years;
 - *Mathematical Economics*, lectures for graduate students, delivered 2 years.
- Lectureships, including exercise supervision, on different courses in mathematics as Assistant Professor (1987-1994).

Research experience (in reverse chronological order):

- statistics and inverse problems, and their applications in mathematical biology and mathematical neuroscience: independent component analysis and blind signal separation, sparse representation of signals, statistical learning theory, support vector machines.
- Participated in editing, correction and development of the book "Adaptive Blind Signal and Image Processing" by A. Cichocki and S. Amari, John Wiley & Sons, 2002.
- Participated in development of software packages "ICA Lab. for Signal Processing and "ICA Lab. for Image Processing" (see <http://www.bsp.brain.riken.jp>).
- analysis: variational and non-smooth analysis, geometry of Banach spaces, set-valued mappings, fixed point theorems, minimax theorems, etc.
- optimization: optimality conditions, parametric dependence of the solutions, numerical methods, optimal control and calculus of variations, equilibrium problems, vector optimization.

Supervised Ph.D. Students: Nadia P. Zlateva - defended Ph.D. thesis 1999

Supervised Master of Science Students: 9, defended.

Computer skills:

- Matlab, C++, LaTeX, Word, Powerpoint
- Co-author of software packages "ICA Lab. for Signal Processing and "ICA Lab. for Image Processing", free downloadable at <http://www.bsp.brain.riken.jp>

Visiting positions, grants, awards:

- Hirosaki University, Japan, December 1999 - August 2000, Japan Society of Promotion of Science (JSPS) award and local grant.
- University of Roma 2, Italy, 1.5 months, July and September 1999, CNR grant (Italy).
- University of Pau, France, 3 months, 1999, NATO grant CB/JB SC105 N⁰ 44/96165.
- University of Roma II, "Tor Vergata", Italy, 1 month, July 1998, CNR grant (Italy).
- Complutenza University Madrid, 1 week, November 1997 (local grant).
- University of Messina, Italy, 1 week, October 1997 (award of Ministry of Education and Science in Bulgaria).
- University of Rome 2, "Tor Vergata", 1 month, 1996, CNR grant (Italy).
- University of Mons-Hainaut, Belgium, 1 month, 1995, TEMPUS grant, European Union.
- University of Rome 2, "Tor Vergata", 1 month, 1995, TEMPUS grant, European Union.
- International Center for Theoretical Physics (ICTP), Trieste, Italy, 6 months, 1995 (ICTP grant).
- Gold medal in the National Competition for high school students' papers, (1975, Bulgaria)

International Seminars (lectures): in more than 20 Universities in: Italy – Rome (University of Rome II), ITCP (Trieste), SISSA (Trieste), Genoa, Florence, Naples, Messina, L'Aquila; France – Paris VI, Montpellier II, Pau, Perpignan, Avignon; Spain – Complutenza University Madrid, Alicante; Belgium – Mons, Leuven La Neuve; Japan – Tokyo University of Science, Tokyo Institute of Technology, Waseda University Tokyo, Hirosaki University, Niigata University; USA – University of Cincinnati.

International conferences (lectures): more than 40 conferences in Europe, Asia, USA.

International conferences – member of the program committee:

- "Data Mining, Systems Analysis and Optimization in Neuroscience", University of Florida, February 2006, <http://www.ise.ufl.edu/cao/neuroscience2006/>
- 6th International Conference on "Independent Component Analysis and Blind Source Separation", ICA2006 Charleston, South Carolina, USA, March 5-8, 2006, <http://www.cnel.ufl.edu/ica2006/committees.php>
- 4th International Conference on "Independent Component Analysis and Blind Source Separation", Nara, Japan April 2003, <http://www.kecl.ntt.co.jp/icl/signal/ica2003/>

Membership: American Mathematical Society, Union of the Bulgarian Mathematicians, IEEE.

Other activities: member of the Specialized Scientific Council for Mathematics at the High Attestation Committee, Bulgaria (1997 - 2001).

PUBLICATIONS of PANDO GR. GEORGIEV

Updated January 1, 2006

A: Mathematical papers from MathSciNet

46. Georgiev, Pando Gr., Parametric Borwein-Preiss variational principle and applications. Proc. Amer. Math. Soc. 133 (2005), no. 11, 3211–3225.
45. Georgiev, Pando Gr., Porosity and differentiability in smooth Banach spaces. Proc. Amer. Math. Soc. 133 (2005), no. 6, 1621–1628.
44. Georgiev, Pando Gr., Random critical points. Proc. 3-rd Intern. Conf. on Nonlinear analysis and convex analysis, 49–57, Yokohama Publ., Yokohama, 2004.
43. Daniilidis, A.; Georgiev, P., Cyclic hypomonotonicity, cyclic submonotonicity, and integration. J. Optim. Theory Appl. 122 (2004), no. 1, 19–39.
42. De Blasi, F. S.; Georgiev, P. G.; Myjak, J., On porous sets and best approximation theory. J. Nonlinear Convex Anal. 5 (2004), no. 2, 247–255.
41. Daniilidis, Aris; Georgiev, Pando, Approximate convexity and submonotonicity. J. Math. Anal. Appl. 291 (2004), no. 1, 292–301.
40. Nishizawa, Shogo; Tanaka, Tamaki; Georgiev, Pando Gr., On inherited properties for vector-valued multifunctions. Multi-objective programming and goal programming, 215–220, Adv. Soft Comput., Springer, Berlin, 2003.
39. Donchev, Tzanko; Georgiev, Pando, Relaxed submonotone mappings. Abstr. Appl. Anal. 2003, no. 1, 19–31.
38. De Blasi, Francesco S.; Georgiev, Pando Gr., Hukuhara's topological degree for non compact valued multifunctions. Publ. Res. Inst. Math. Sci. 39 (2003), no. 1, 183–203.
37. Daniilidis, Aris; Georgiev, Pando; Penot, Jean-Paul, Integration of multivalued operators and cyclic submonotonicity. Trans. Amer. Math. Soc. 355 (2003), no. 1, 177–195.
36. Georgiev, Pando; Cichocki, Andrzej, On some new ideas and algorithms for independent component analysis. Nonlinear analysis and convex analysis (Kyoto, 2001). Sūrikaiseikikenkyūsho Kōkyūroku No. 1246 (2002), 19–30.
35. De Blasi, Francesco S.; Georgiev, Pando Gr., On a fixed point theorem of Ky Fan. Acta Math. Sin. (Engl. Ser.) 18 (2002), no. 2, 363–374.
34. Finet, C.; Georgiev, P., Optimization by n -homogeneous polynomial perturbations. Hommage Pascal Laubin. Bull. Soc. Roy. Sci. Lige 70 (2001), no. 4-6, 251–257 (2002).
33. Georgiev, Pando Gr., ; Tanaka, Tamaki, Fan's inequality for set-valued maps. Proceedings of the Third World Congress of Nonlinear Analysts, Part 1 (Catania, 2000). Nonlinear Anal. 47 (2001), no. 1, 607–618.

32. De Blasi, Francesco S.; Georgiev, Pando Gr., Kakutani-Fan's fixed point theorem in hyperspaces. *Tokyo J. Math.* 24 (2001), no. 2, 331–342.
31. Nishizawa, Shogo; Tanaka, Tamaki; Georgiev, Pando Gr., On the heredity of the convexity of set-valued maps. *Perspective and problems for dynamic programming with uncertainty* (Kyoto, 2001). *Sūrikaiseikikenkyūsho Kōkyūroku No. 1207* (2001), 67–78.
30. Nishizawa, Shogo; Georgiev, Pando Gr., ; Tanaka, Tamaki, Scalarization of set-valued maps and Ky Fan inequalities. *Perspective and problems for dynamic programming with uncertainty* (Kyoto, 2001). *Sūrikaiseikikenkyūsho Kōkyūroku No. 1207* (2001), 55–66.
29. Georgiev, Pando Gr., ; Tanaka, Tamaki, Minimax theorems for vector-valued multifunctions. *Nonlinear analysis and convex analysis* (Kyoto, 2000). *Sūrikaiseikikenkyūsho Kōkyūroku No. 1187* (2001), 155–164.
28. Georgiev, Pando Gr., ; Tanaka, Tamaki, Ky Fan's inequality for set-valued maps with vector-valued images. *Nonlinear analysis and convex analysis* (Kyoto, 2000). *Sūrikaiseikikenkyūsho Kōkyūroku No. 1187* (2001), 143–154.
27. Georgiev, P. G., Parametric Ekeland's variational principle. *Appl. Math. Lett.* 14 (2001), no. 6, 691–696.
26. De Blasi, Francesco S.; Georgiev, Pando Gr., A random variational principle with application to weak Hadamard differentiability of convex integral functionals. *Proc. Amer. Math. Soc.* 129 (2001), no. 8, 2253–2260.
25. Georgiev, Pando Gr., Parametric variational principles in Banach spaces and selection theorems. *Mathematical science of optimization* (Kyoto, 2000). *Sūrikaiseikikenkyūsho Kōkyūroku No. 1174* (2000), 217–229.
24. Georgiev, Pando Gr., ; Tanaka, Tamaki, Vector-valued set-valued variants of Ky Fan's inequality. *J. Nonlinear Convex Anal.* 1 (2000), no. 3, 245–254.
23. Georgiev, Pando G., A modified smooth variational principle and its parametrization. *Compt. Rend. Acad. Bulg. Sci.* 53 (2000), no. 9, 17–20.
22. Georgiev, Pando Grigorov; Tanaka, Tamaki, Fan's inequalities for vector-valued multifunctions. *Proc. Japan Acad. Ser. A Math. Sci.* 76 (2000), no. 9, 153–157.
21. Georgiev, Pando Gr., Variational principles in Banach spaces and their parametrizations. *Research on nonlinear analysis and convex analysis* (Kyoto, 1999). *Sūrikaiseikikenkyūsho Kōkyūroku No. 1136* (2000), 13–27.
20. Georgiev, Pando Gr., ; Zlateva, Nadia P., Reconstruction of the Clarke subdifferential by the Lasry-Lions regularizations. *J. Math. Anal. Appl.* 248 (2000), no. 2, 415–428.
19. Georgiev, P. G.; Granero, A. S.; Jimnez Sevilla, M.; Moreno, J. P., Mazur intersection properties and differentiability of convex functions in Banach spaces. *J. London Math. Soc.* (2) 61 (2000), no. 2, 531–542.
18. Georgiev, P.; Zlateva, N., Lasry-Lions regularizations and reconstruction of subdifferentials. *Compt. Rend. Acad. Bulg. Sci.* 51 (1998), no. 9–10, 9–12.

17. Georgiev, Pando Gr., ; Zlateva, Nadia P., Generic Gateaux differentiability via smooth perturbations. *Bull. Austral. Math. Soc.* 56 (1997), no. 3, 421–428.
16. Georgiev, Pando Gr., Submonotone mappings in Banach spaces and applications. *Set-Valued Anal.* 5 (1997), no. 1, 1–35.
15. Georgiev, Pando Gr., ; Todorov, Maxim I. Well-posedness in linear infinite optimization. *Parametric optimization and related topics, IV (Enschede, 1995)*, 111–121, *Approx. Optim.*, 9, Lang, Frankfurt am Main, 1997.
14. Georgiev, Pando Gr., ; Zlateva, Nadia P., Second-order subdifferentials of $C^{1,1}$ functions and optimality conditions. *Set-Valued Anal.* 4 (1996), no. 2, 101–117.
13. Georgiev, P.; Kutzarova, D.; Maaden, A. On the smooth drop property. *Nonlinear Anal.* 26 (1996), no. 3, 595–602.
12. Georgiev, P. G.; Zlateva, N. P., Second subdifferentials of $C^{1,1}$ functions: optimality conditions and well posedness. *Compt. Rend. Acad. Bulg. Sci.* 46 (1993), no. 11, 25–28 (1994).
11. Georgiev, P. Gr., Approximation of convex bodies in R^m by polytopes. *Compt. Rend. Acad. Bulg. Sci.* 46 (1993), no. 9, 29–31 (1994).
10. Georgiev, Pando Gr., On the residuality of the set of norms having Mazur’s intersection property. *Math. Balkanica (N.S.)* 5 (1991), no. 1, 20–26.
9. Georgiev, Pando Gr., The smooth variational principle and generic differentiability. *Bull. Austral. Math. Soc.* 43 (1991), no. 1, 169–175.
8. Georgiev, P. Gr., Fréchet differentiability of convex functions in separable Banach spaces. *Compt. Rend. Acad. Bulg. Sci.* 43 (1990), no. 9, 13–15.
7. Georgiev, P. Gr., Uniqueness of the alternating points of the linear and convex Chebyshev approximation. *Compt. Rend. Acad. Bulg. Sci.* 42 (1989), no. 9, 21–22.
6. Georgiev, Pando Gr., Mazur’s intersection property and a Kreĭn- Milman type theorem for almost all closed, convex and bounded subsets of a Banach space. *Proc. Amer. Math. Soc.* 104 (1988), no. 1, 157–164.
5. Georgiev, Pando Gr., The strong Ekeland variational principle, the strong drop theorem and applications. *J. Math. Anal. Appl.* 131 (1988), no. 1, 1–21.
4. Georgiev, Pando G., A counterexample from the approximation of plane convex compacta by inscribed polygons. *Mathematics and mathematical education (Sunny Beach (Slunchev Bryag), 1986)*, 196–201, *Publ. House Bulgar. Acad. Sci., Sofia*, 1986.
3. Georgiev, P. G., Strengthened forms of Ekeland’s variational principle, of the drop theorem, and some applications. *Compt. Rend. Acad. Bulg. Sci.* 39 (1986), no. 8, 15–18.
2. Georgiev, Pando G., Almost all convex, closed and bounded subsets of a Banach space are dentable. *Mathematics and mathematical education (Sunny Beach (Slunchev Bryag), 1985)*, 355–361, *Bulgar. Akad. Nauk, Sofia*, 1985.

1. Georgiev, Pando G., Approximation of convex n -gons by $(n - 1)$ -gons. (Bulgarian) Mathematics and mathematical education (Sunny Beach, 1984), 289–303, Bulgar. Akad. Nauk, Sofia, 1984.

B: Mathematical papers not in MathSciNet, related to applied mathematics:

B1: Refereed journal papers related to applied mathematics:

7. Pando Georgiev, Anca Ralescu and Dan Ralescu, “Cross-cumulants measure for independence”, accepted in the Journal of Statistical Planning and Inference.
6. P. Georgiev, P. Pardalos and F. Theis, “A bilinear algorithm for sparse representations”, accepted in JCOAP (Journal of Computational Optimization and Applications).
5. Pando Georgiev, Panos Pardalos and Andrzej Cichocki, “Algorithms with high order convergence speed for blind source extraction”, accepted in JCOAP (Journal of Computational Optimization and Applications).
4. Pando Georgiev and Henry Tuckwell, “ On the possible use of ICA to identify synaptic inputs from observations of several neurons”, *Neurocomputing* **67** (2005) 450 - 455.
3. Georgiev P., F. Theis and A. Cichocki, ”Sparse Component Analysis and Blind Source Separation of Underdetermined Mixtures” *IEEE Transactions of Neural Networks*, Vol. 16, No. 4, July 2005, 992 – 996.
2. Georgiev, P., and A. Cichocki, “Robust Independent Component Analysis via Time-Delayed Cumulant Functions”, *IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences*, Vol. E86-A, No.3 (2003), pp. 573-579.
1. Cichocki, A., and P. Gr., Georgiev, “Blind Source Separation Algorithms with Matrix Constraints”, *IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences*, Vol. E86-A, No. 3 (2003), pp. 522-531 (invited paper).

B2: Refereed chapters of books and book series related to applied mathematics:

8. Pando Georgiev, Danielle Nuzillard and Anca Ralescu, Sparse Deflations in Blind Signal Separation, accepted in the book series ”Lecture Notes in Computer Science” (Proc. 5-th Int. Conf. on Independent Component Analysis and Blind Signal Separation, March 2006, Charleston, SC).
7. Pando Georgiev, Fabian Theis and Andrzej Cichocki, “Optimization Algorithms for Sparse Representations and Applications”, chapter, accepted in the book ”Multiscale Optimization Methods and Applications”, Springer, P. Pardalos, ed.
6. Georgiev P., F. Theis, A. Cichocki and H. Bakardjian, ”Sparse component analysis: a new tool for data mining”, chapter in a book from ”Biocomputing” book series, Kluwer Academic Publishers (in press).
5. P. Georgiev and F. Theis, ”Blind Source Separation of Linear Mixtures with Singular Matrices”, Lecture Notes in Computer Science, Springer-Verlag Heidelberg, Vol. 3195, 2004, pp. 121 – 128.

4. F.J. Theis, P. Georgiev, and A. Cichocki. Blind source recovery: algorithm comparison and fusion. In Proc. of 24-th International Workshop on Bayesian Inference and Maximum Entropy Methods in Science and Engineering (MaxEnt 2004), volume 735 of AIP (American Institute of Physics) conference proceedings, pages 320-327, Garching, Germany, 2004.
3. Georgiev P., A. Cichocki and H. Bakardjian, "Optimization techniques for independent component analysis with applications to EEG data," chapter in the book "Quantitative Neuroscience: Models, Algorithms, Diagnostics, and Therapeutic Applications", pp. 53-68, Boston, USA: Kluwer Academic, 2004.
2. Georgiev, Pando; Cichocki, Andrzej, "Sparseness theorems and sparse representation of signals". Nonlinear analysis and convex analysis (Kyoto, 2003). *Sūrikaisekikenkyūsho Kōkyūroku* No. 1386 (2004), 13-25.
1. Georgiev, P., and Andrzej Cichocki, "Robust Blind Source Separation utilizing second and fourth order statistics", *Lectures Notes in Computer Science*, **2415**(2002), pp. 1162-1167.

B3: Refereed conference papers related to applied mathematics:

14. Pando Georgiev, Anca Ralescu, "Clustering on Subspaces and Sparse Representation of Signals", The 48th IEEE International Midwest Symposium on Circuits and Systems, August 7-10, Cincinnati, USA (to appear).
13. P. Georgiev, F. Theis and A. Ralescu, "Sparse Representations of Data and Support Vector Machines", Proc. of 10-th Intern. Conf. on Information Processing and Management of Uncertainty in Knowledge-Based Systems, July 4-9, 2004, Perugia, Italy (IPMU 2004), pp.2109 – 2116.
12. P. G. Georgiev, F. J. Theis, and A. Cichocki, "Blind source separation and sparse component analysis of overcomplete mixtures," in Proceedings of International Conference on Acoustics, Speech, and Signal Processing (ICASSP2004), vol. V, (Montreal, Canada), pp. 493-496, IEEE Signal Processing Society, IEEE, May 2004.
11. P. G. Georgiev and A. Cichocki, "Sparse component analysis of overcomplete mixtures by improved basis pursuit method," in Proceedings of 2004 IEEE International Symposium on Circuits and Systems (ISCAS2004), vol. V, (Vancouver, Canada), pp. 37-40, IEEE, May 2004.
10. A. Cichocki, Y. Li, P. G. Georgiev, and S. Amari, "Beyond ICA: Robust sparse signal representations," in Proceedings of 2004 IEEE International Symposium on Circuits and Systems (ISCAS2004), vol. V, (Vancouver, Canada), pp. 684-687, IEEE, May 2004.
9. F. J. Theis, P. G. Georgiev, and A. Cichocki, "Robust overcomplete matrix recovery for sparse sources using a generalized Hough transform," in Proceedings of 12th European Symposium on Artificial Neural Networks (ESANN2004), (Bruges, Belgium), pp. 343-348, Apr. 2004.
8. Georgiev, P., and Andrzej Cichocki, "Robust Blind Source Separation and Dispersing Algorithms", in *Proc. Intern. Conf. on Acoustics Speech and Signal Processing (ICASSP 2002)*, Orlando, Florida, May 13-17, 2002 pp. I-997 - I-1000.

7. Lars Kindermann and Pando Georgiev, "Modelling Iterative Roots of Mappings in Multidimensional Spaces", Proceedings of the 9th International Conference on Neural Information Processing (ICONIP'02), Singapore 2002, 2655-2659.
6. Cichocki, A., and P. Georgiev, "Blind Identification Problems with Constraints", in *Neural Networks for Signal Processing XII, Proceedings of the 2002 IEEE Workshop*, Martigny, Switzerland, Sept. 2002, pp. 535-544.
5. Georgiev, P., A. Cichocki, and S. Amari, "On Some Extensions of the Natural Gradient Algorithm", in *Proc. Third International Conference on Independent Component Analysis and Blind Signal Separation*, San Diego, California, Dec. 9-13, 2001, pp. 581-585.
4. Georgiev, P., "Blind source separation of bilinearly mixed signals", in *Proc. Third International Conference on Independent Component Analysis and Blind Signal Separation*, San Diego, California, Dec. 9-13, 2001, pp. 328-330.
3. Georgiev, P., and A. Cichocki, "Blind Source Separation via Symmetric Eigenvalue Decomposition", in *Proc. Sixth International Symposium on Signal Processing and its Applications*, Kuala Lumpur, Malaysia, Aug. 13-16, 2001, pp. 17-20.
2. Pando Gr., Georgiev, Andrzej Cichocki and Shun-ichi Amari, "Nonlinear dynamical system generalizing the natural gradient algorithm", Proc. 2001 Intern. Symposium on Nonlinear Theory and its Applications (NOLTA), Miyagi Zao Royal Hotel, Miyagi, Japan, Oct. 28-Nov. 1, 2001, pp. 391-394.
1. Georgiev, P., and A. Cichocki, "Multichannel Blind Deconvolution of Colored Signals via Eigenvalue Decomposition", *Proc. 2001 IEEE Workshop on Statistical Signal Processing*, Orchid Country Club, Singapore, Aug. 6-8, 2001, pp. 273-276.

Signature:

Pando Georgiev