

# NICOLAS HADJISAVVAS

## Professor

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## UNDERGRADUATE STUDIES

Bachelors Degree: Physics, University of Athens 1976.

## POSTGRADUATE STUDIES

- DEA in Mathematical Physics: Université de Reims, France 1977.
- Ph.D.: Doctorat d'Etat, Université de Reims, France 1981.

## PROFESSIONAL SOCIETIES/INTERNATIONAL COMMITTEES

- Past chair of the Working Group on Generalized Convexity (400 members from 46 countries), 2003-2006. Interim Chair (October 2008-June 2009).
- American Mathematical Society.
- Mathematical Programming Society.

## EDITORIAL BOARDS - REFEREEING

- Member of the Editorial Board for the following Journals: Optimization; Journal of Global Optimization; Optimization Letters. The first two are included in the ISI Science Citation Index.
- Referee for the following journals: Journal of Optimization Theory and Applications; SIAM Journal on Optimization; Mathematical Programming; Journal of Global Optimization; Optimization; Journal of Convex Analysis; Optimization Letters; Mathematical Methods of Operations Research; Mathematics of Operations Research; Acta Mathematica Hungarica; Journal of Mathematical Analysis and Applications; Journal of Statistics and Management Systems; Lecture Notes in Economics and Mathematical Systems; Annals of Operations Research; Computational Optimization and Applications; Journal of Interdisciplinary Mathematics; Journal of Nonlinear and Convex Analysis; Journal of Computational and Applied Mathematics; Journal of Inequalities in Pure and Applied Mathematics (Electronic); Serdica; Mathematical and Computer Modelling; International Journal of Mathematics and Mathematical Sciences, as well as for various international Conference Proceedings.
- Reviewer for Zentralblatt für Mathematik and for Mathematical Reviews.

## RESEARCH INTERESTS

Generalized Convexity and Monotonicity, Convex and Nonconvex Analysis, Nonsmooth Analysis, Variational Inequality Problems - Equilibrium Problems, Mathematical Foundations of Quantum Mechanics.

## BOOKS

1. D. Kravvaritis, G. Pantelidis, N. Hadjisavvas: *Ordinary Differential Equations* (in Greek). Ziti Publications, 1990, Thessaloniki (Textbook).
2. N. Hadjisavvas, D. Hughes-Hallett, I. Vakalis (eds): Proceedings of the International Conference on the teaching of Mathematics (July 3-6, 1998 Pythagorion, Samos, Greece), John Wiley and Sons, Inc., 1998.
3. N. Hadjisavvas, J.E. Martinez-Legaz, J.P. Penot (Eds): *Generalized Convexity/ Monotonicity*, Springer-Verlag, 2001.
4. N. Hadjisavvas, P. Pardalos (Eds). *Advances in Convex Analysis and Global Optimization*, Kluwer Academic Publishers, 2001.
5. A. Eberhard, N. Hadjisavvas and D.T. Luc (Eds.), *Generalized Convexity, Monotonicity and Applications*, Springer, 2005.
6. N. Hadjisavvas, S. Komlosi and S. Schaible, *Handbook on Generalized Convexity and Generalized Monotonicity*, Springer, 2005.

## BOOK CHAPTERS AND PAPERS IN CONFERENCE PROCEEDINGS

1. N. Hadjisavvas and S. Schaible: *Pseudomonotonicity and Quasimonotonicity in Variational Inequalities and Equilibrium Problems*, in “Generalized Convexity, Generalized Monotonicity”, Proceedings of the fifth Symposium on Generalized Convexity. J.P. Crouzeix, J.E. Martinez-Legaz, M. Volle (eds). Kluwer, 1998.
2. N. Hadjisavvas: *Maximal Pseudomonotone Operators*, in: Recent advances in Optimization, G.P. Crespi, A. Guerraggio, E. Miglierina, M. Rocca (eds), Proceedings of the workshop held in Varese, 13-14/6/2002 (invited talk), Datanova Editrice, 2003.
3. N. Hadjisavvas, D. Kravvaritis, G. Pantelides: *On nonlinear monotone Operators with values in  $L(X,Y)$* . (in: Constantine Caratheodory: An international Tribute. Th. Rassias, Editor. Word Scientific Publications Company, 1990).
4. N. Hadjisavvas and S. Schaible: *Generalized Monotone Single Valued Maps*, (ii) *Generalized Monotone Multi Valued Maps* (iii) *Generalized Monotonicity: Applications to Variational Inequalities and Equilibrium Problems* (three refereed articles in: Encyclopedia of Optimization, P. Pardalos and G. Floudas (eds), Kluwer Academic Publishers).
5. N. Hadjisavvas, S. Schaible: *Generalized Monotone Maps*, in: Handbook on Generalized Convexity and Generalized Monotonicity, Springer, 2004.
6. N. Hadjisavvas: *Generalized Convexity, Generalized Monotonicity and Nonsmooth Analysis*, in: Handbook on Generalized Convexity and Generalized Monotonicity, Springer, 2005.
7. N. Hadjisavvas: *Pseudomonotone Maps: Properties and Applications*, in: Encyclopedia of Optimization, P. Pardalos and G. Floudas (eds), Springer (2008).

## PAPERS IN JOURNALS

1. N. Hadjisavvas: *Etude de certaines conséquences d' une interprétation subjective de la notion d' état*. Ann. Fond. Louis de Broglie, 3, 155-176 (1978).
2. N. Hadjisavvas and M. Mugur-Schachter: *Unbounded measures on the closed subspaces of a Hilbert space*. Lett. Nuovo Cim. 23, 439-443 (1978).
3. N. Hadjisavvas: *Non conservation du moment cinétique total, selon la Théorie Quantique des mesures, lors d' une mesure de spin*. Lett. Epist. 24, 14-20 (1979).

4. N. Hadjisavvas, F. Thieffine and M. Mugur-Schachter: *Study of Piron's system of questions and propositions*. Found. Phys. 10, 751 (1980).
5. N. Hadjisavvas: *The Maximum Entropy Principle as a consequence of the principle of Laplace*. J. Stat. Phys. 26, 807-815 (1981).
6. F. Thieffine, N. Hadjisavvas and M. Mugur-Schachter: *Supplement to a critique of Piron's system of questions and propositions*. Found. Phys. 11, 645-649 (1981).
7. N. Hadjisavvas: *Distance between states and statistical inference in Quantum Theory*. Ann. Inst. Henri Poincare, 35, 287-309 (1981).
8. N. Hadjisavvas: *Properties of mixtures of non-orthogonal states*. Lett. Math. Phys. 5, 327-332 (1981).
9. N. Hadjisavvas, F. Thieffine and M. Mugur-Schachter: *Critical remark on Jauch's Program*. Lett. Nuovo Cim. 30, 530-532 (1981).
10. N. Hadjisavvas: *On the "Hidden Variables" theory of A. Bach*. Phys. Lett. 82A, 107-108 (1982).
11. N. Hadjisavvas: *On Cantoni's generalized transition probability*. Comm. Math. Phys. 83, 43-48 (1982).
12. M. Mugur-Schachter, N. Hadjisavvas: *The probabilistic-informational concept of an opacity functional*. Kybernetes, 11, 1890183 (1982).
13. N. Hadjisavvas: *The Role of the "Hidden Variables" of the Apparatus in Bell's Theorem*. Epist. Lett. 69.0, 1-3 (1983).
14. N. Hadjisavvas: *What a hidden variables theory is not*. Epist. Lett. 69.2, 5-8 (1983).
15. N. Hadjisavvas, A. K. Theophilou: *A rigorous formulation of the Kohn and Sham theory*. Phys. Rev. A30, 2183-2186 (1984).
16. N. Hadjisavvas, A. K. Theophilou: *A rigorous formulation of the Slater's transition-state theory for excited states*. Phys. Rev. A32, 720-724, (1985).
17. N. Hadjisavvas: *Metrics on the set of states of a  $W^*$ -algebra*. Lin. Alg. and its Appl. 84, 281-287 (1986).
18. N. Hadjisavvas, B. Nassopoulos and G. Pantelides: *Über die Existenz gemeinsamer Elemente bester Approximation bezüglich zweier Normen*. Manuscr. Math. 58, 245-252 (1987).
19. N. Hadjisavvas, B. Nassopoulos and G. Pantelides: *On the renorming of a vector space endowed with two norms and the simultaneous approximation problem*. Math. Annalen 280, 549-557 (1988).
20. N. Hadjisavvas, D. Kravvaritis, G. Pantelides, I. Polyrakis: *Nonlinear monotone Operators with values in  $L(X,Y)$* . J. Math. Anal. Appl. 140, 83-94 (1989).
21. N. Hadjisavvas, D. Kravvaritis, G. Pantelides, I. Polyrakis: *Hereditary order convexity in  $L(X,Y)$* . Rend. Circ. Mat. Palermo 38, 130-139 (1989).
22. N. Hadjisavvas, D. Kravvaritis, G. Pantelides: *Structural properties of nonlinear monotone Operators with values in  $L(X,Y)$* . Serdica 16, 246-248 (1990).
23. N. Hadjisavvas and S. Schaible: *On strong Pseudomonotonicity and (Semi)strict Quasimonotonicity*. J. Optim. Th. Appl. 79, 139-155 (1993).
24. N. Hadjisavvas, D. Kravvaritis and I. Polyrakis: *Weakly compact subsets of  $L_1(\mu, X)$  and  $bvca(\Sigma, X)$* . Rend. Circ. Mat. Palermo 48 (series II), 119-126 (1994).
25. N. Hadjisavvas, S. Schaible: *Quasimonotone Variational Inequalities in Banach Spaces*. J. Optim. Theory Appl. 90, 95-111 (1996).
26. A. Daniilidis, N. Hadjisavvas: *Existence Theorems for Vector Variational Inequalities*, Bull. Austr. Math. Soc. 54, 473-481 (1996).

27. A. Daniilidis, N. Hadjisavvas and S. Schaible: *Connectedness of the efficient set for three-objective quasiconcave optimization problems*. J. Optim. Theory Appl 93, 517-524 (1997).
28. M. Bianchi, N. Hadjisavvas and S. Schaible: *Vector Equilibrium Problems with Generalized Monotone Bifunctions*. J. Optim. Theory Appl. 92, 527-542 (1997).
29. N. Hadjisavvas, S. Schaible: *From Scalar to Vector Equilibrium Problems in the Quasimonotone Case* J. Optim. Theory Appl. Vol. 96, 297-309 (1998).
30. A. Daniilidis, N. Hadjisavvas: *Coercivity conditions and variational inequalities*. Mathematical Programming 86, 433-438 (1999).
31. A. Daniilidis and N. Hadjisavvas: *Characterization of Nonsmooth Semistrictly Quasiconvex and Strictly Quasiconvex Functions*, J. Optim. Theory Appl. Vol. 102, 525-536 (1999).
32. A. Daniilidis and N. Hadjisavvas: *On the Subdifferentials of Pseudoconvex and Quasiconvex Functions and Cyclic Monotonicity*, J. Math. Anal. Appl. Vol. 237, 30-42 (1999).
33. A. Daniilidis and N. Hadjisavvas: *On Generalized Cyclically Monotone Operators and Proper Quasimonotonicity*, Optimization Vol 47, 123-135 (2000).
34. A. Daniilidis, N. Hadjisavvas and J.E. Martinez-Legaz: *An appropriate subdifferential for quasiconvex functions*, SIAM J. on Optimization 12, 407-420 (2001).
35. N. Hadjisavvas, *The use of subdifferentials for studying generalized convex functions*, Journal of Statistics and Management Systems 5, 125-139 (2002).
36. M. Bianchi, N. Hadjisavvas and S. Schaible, *On pseudomonotone maps  $T$  for which  $-T$  is also pseudomonotone*, J. Conv. Anal. 10, 465-475 (2003).
37. N. Hadjisavvas, *Hadamard-type inequalities for quasiconvex functions*, J. Inequal. Pure Appl. Math. Vol 4, Issue 1, Article 13 (2003). (electronic).
38. N. Hadjisavvas: *Continuity and Maximality Properties of Pseudomonotone Operators*, J. Convex Anal. 10, 465--475 (2003).
39. D. Aussel and N. Hadjisavvas, *On Quasimonotone Variational Inequalities*, J. Optim. Theory Appl. 121, 223-228 (2004).
40. M. Bianchi, N. Hadjisavvas and S. Schaible, *Minimal Coercivity Conditions and Exceptional Families of Elements in Quasimonotone Variational Inequalities*, J. Optim. Theory Appl. 122, 1-17 (2004).
41. D. Aussel and N. Hadjisavvas, *Adjusted sublevel sets, normal operator and quasiconvex programming*, SIAM J. Optimization 16, 358-367, 2005.
42. M. Bianchi, N. Hadjisavvas and S. Schaible, *Exceptional families of elements for variational inequalities in Banach spaces*, J. Optim. Theory Appl. 129, 23-31 (2006).
43. N. Hadjisavvas and S. Schaible, *On a generalization of paramonotone maps and its application to solving the Stampacchia variational inequality*, Optimization 55, 593-604 (2006).
44. N. Hadjisavvas, *Translations of Quasimonotone Maps and Monotonicity*, Applied Mathematics Letters 19, 913-915 (2006).
45. F. Flores-Bazán, N. Hadjisavvas and C. Vera, *An optimal alternative theorem and applications to mathematical programming*, J. Global Optim. 37, 229-243 (2007).
46. M.R. Bai and N. Hadjisavvas, *Relaxed quasimonotone operators and relaxed quasiconvex functions*, J. Optim. Theory Appl. 138, 329-339 (2008).

47. N. Hadjisavvas and H. Khatibzadeh, *Maximal monotonicity of bifunctions*, Optimization (to appear).
48. L. C. Ceng, N. Hadjisavvas, S. Schaible, and J. C. Yao, *Well-Posedness for Mixed Quasivariational-Like Inequalities*, J. Optim. Theory Appl. 139, 109-125 (2008).
49. N. Hadjisavvas and S. Schaible, *Pseudomonotone\* maps and the cutting plane property*, J. Global Optim. (to appear).

### **Papers in conference proceedings**

1. N N. Hadjisavvas: *Maximal Pseudomonotone Operators*, in: Recent advances in Optimization, G.P. Crespi, A. Guerraggio, E. Miglierina, M. Rocca (eds), Proceedings of the workshop held in Varese, 13-14/6/2002 (invited talk), Datanova Editrice, 2003. G

### **CITATIONS**

There are more than 430 papers citing Hadjisavvas' work (not including self-citations or self-citations of collaborators). Mathscinet (whose citation database starts on year 2000) mentions: "Nicolas Hadjisavvas is cited 245 times by 131 authors". A lot of these papers were based mainly on Hadjisavvas' work and mention specifically that their main aim is to continue or generalize his results. Among these, the following 6 papers mention his work *in their abstract*:

1. Benoist J., Popovici N., Journal of Optimization Theory and Applications 111, 81-116, 2001.
2. Kang M.K., Lee B.S., Applied Mathematical Letters 17, 889-896, 2004.
3. Kusakabe F., Journal of the Physical Society of Japan, 70, 2038-2048, 2001.
4. Oettli W., Acta Mathematica Vietnamica, 22, 213, 1997.
5. Yang, Y., Numerical Mathematics, 22 141-146, 2000.
6. Zhao Y.B., Isac, G., Journal of Optimization Theory and Applications, 105, 213-231, 2000.

The textbook of B.C. van Fraassen "Quantum Mechanics" mentions the "Hadjisavvas theorem" and makes this note: "This is a subject with history, starting by an inspired guess of Schroedinger and ending by the fully general results of Hadjisavvas". The same result has been characterized by F. Herbut (J. Phys. A 37, 5243-5250, 2004) as "important" and by P. Bush (Studies in History and Philosophy of Modern Physics 33, 517-539, 2002) as "fundamental".

### **OTHER DISTINCTIONS**

- Chair of the Working Group on Generalized Convexity (2003-2006), an international Society of 425 members from 50 countries (<http://www.genconv.org> and more specifically [http://www.genconv.org/W\\_committee.shtml](http://www.genconv.org/W_committee.shtml)). Interim chair (October 2008-June 2009).

- Invited speaker in international conferences held in Barcelona (Spain), Varese (Italy), Erice (Italy), Isfahan (Iran) (twice), Shanghai (China), Kaohsiung (Taiwan) (twice).
- Invited Professor for prolonged stays in several Universities, such as: Universidad de Concepcion, Chile; Université de Perpignan, France; Université de Pau, France; University of California at Riverside, USA (8 times); Catholic University of Milan, Italy (twice), National Sun Yat-Sen University, Taiwan (twice).
- Member of the program committee and/or organizing committee of several international conferences.