ABBREVIATED CURRICULUM VITAE OF **HÉCTOR J. SUSSMANN**

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A more detailed CV, including a complete list of publications, is available at H. J. Sussmann's Web page.

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Born in Buenos Aires, Argentina, April 13, 1946. U.S. Citizen. Married.

Education:

- Ph.D. in Mathematics, Sept. 1969, Courant Institute of Mathematical Sciences, New York University.
- Licenciado en Matemáticas, University of Buenos Aires, Argentina, December 1966.

Full-time positions:

- Rutgers University, Department of Mathematics (Assistant Professor, 1972-74; Associate Professor, 1974-78, Professor I, 1978-83; Professor II, 1983-).
- Department of Mathematics, University of Chicago (Dickson Instructor, 1971-72).
- Division of Engineering and Applied Mathematics, Harvard University (Research Fellow in Decision and Control, 1970-71).
- Department of Mathematics, City College, City University of New York (Lecturer, 1969-70).

Selected Visiting Positions (1994-1999 only)

- University of Groningen, Groningen, The Netherlands, (Johann Bernoulli Distinguished Visiting Professor, March 1-15 and May 15 to July 31, 1999).
- Institut Henri Poincaré, Centre Émile Borel Paris, France (Visiting Professor, January-June 1998).
- University of Buenos Aires, Argentina, (Visiting Professor, August 1997).
- INSA (Institut National de Sciences Appliquées), Rouen, France (Visiting Professor, June 1996 and May-June 1997).
- Université de Paris-Sud, Orsay (Visiting Professor, June 1995).
- Université de Marne-la-Vallée, France (Visiting Professor, June 1994).

Awards:

- Fellow of the IEEE, elected in 1995.
- Rutgers University Board of Regents 1997 Award for Excellence in Research (October 1997).
- Award for Outstanding IEEE Control Systems Magazine Paper of the Year, for the paper "300 years of optimal control: from the brachystochrone to the maximum principle," coauthored with J. C. Willems, published in the June 1997 issue of the journal.

Service to the profession (selected items):

- Member of the Council of the American Mathematical Society, 1982-1984.
- Chairman, Organizing Committee of the 1992-1993 Special Year in Control Theory at the Institute for Mathematics and its Applications, University of Minnesota.
- Organizer, American Mathematical Society (AMS) 1997 Summer Research Institute (SRI), on "Differential Geometry and Control," held at the University of Colorado at Boulder, from June 30 to July 18, 1997.
- Organizer, Short course on Nonlinear Control Theory, 1999 Winter meeting of the American Mathematical Society (AMS), San Antonio, Texas, January 13-16, 1999. (The course consisted of six lectures, one by the organizer and five by other mathematicians.)
- Member of various organizing committees of various SIAM and IEEE mathematical or control conferences, and organizer of sessions. Recent examples:
  - Chairman of the committee to write the guidelines for a new SIAM prize, for research in Control Theory, to be awarded by the SIAM activity group in control. (The proposal written by this committte was approved by the SIAM Council, December 1996.)
  - Member, SIAM 1998 Control Group prize committee.
  - Member, organizing committee of the Fourth SIAM Conference on Control and Its Applications, held in Jacksonville, Florida, May 7-9, 1998.
  - Member, program committee of the 38TH IEEE Conference on Decision and Control, to be held on December 7 to 10, 1999, in Phoenix, Arizona.
- Member of various panels for professional organizations and funding agencies. Recent examples:
  - (i) Panel for selection of speakers for Section 17 of the 1994 International Congress of Mathematicians held in Zurich.
  - (ii) National Science Foundation Systems and Engineering panel, February 29-March 1, 1996.
  - (iii) National Science Foundation Learning and Intelligent Systems panel, August 3-5, 1998.
- Editorial positions:
  - — Associate Editor, *SIAM Journal on Control and Optimization*, 1978-1989.
  - — Associate Editor, *Systems and Control Letters*, 1980-84.
  - — Regional Co-managing Editor, *Acta Applicandæ Mathematicæ*, 1982- .
  - — Associate Editor, *Mathematics of Control, Systems and Signals*, 1987-1990.
  - — Associate Editor, *Forum Mathematicum*, 1990- .
  - — Associate Editor, *Neural Networks*, 1993-95.

Ph.D. Theses Sponsored: (1) L. S. Tang, 1978; (2) J. Darken, 1982; (3) G. S. Ferreyra, 1983; (4) H. Schättler, 1986; (5) G. Lafferriere, 1986; (6) W. S. Liu, 1992; (7) G. Q. Tang, 1992; (8) Y. Yang, 1993; (9) Y. Chitour, 1996.

Selected invited talks:

— 45-minute lecture on "Analytic stratifications and control theory," International Congress of Mathematicians, Helsinki, Finland, August 22, 1978.
— Plenary lecture, 1991 Winter meeting of the American Mathematical Society, San Francisco, January 17, 1991. Title: "Recent results and open problems in deterministic nonlinear control."
— Plenary lecture, SIAM Control Conference, Minneapolis, MA, September 1992.
— Plenary lecture, IEEE Conference on Decision and Control (CDC), New Orleans, December 1995.
— Plenary lecture, International Symposium on the Mathematical Theory of Networks and Systems (MTNS-96), St. Louis, Mo., June 1996.
— Plenary lecture, Conference in honor of S. Lojasiewicz on the occasion of his 70th birthday; Kraków, Poland, September 1996.
— Plenary lecture, Congreso de Matemática Capricornio (COMCA'97), held in Antofagasta, Chile, July 30 to August 2, 1997.

— The William B. Kouwenhoven Lecture, Johns Hopkins University, Baltimore, Md., Oct. 22, 1997.
— Plenary lecture, Conference on "Calculus of Variations and Applications," held in Haifa, Israel, March 25 to April 1, 1998.
— Plenary lecture, The 2nd Michigan Interdisciplinary Mathematics Meeting (MIMM II), on "Optimization, Algorithms and Control." University of Michigan at Ann Arbor, May 6-8, 1999.

PUBLICATIONS: 5 books edited, 120 articles in refereed journals and books, 29 invited articles in conference proceedings books, 10 invited survey articles in books, 4 book reviews.

SELECTED PUBLICATIONS:

1. (with V. Jurdjevic) "Controllability of nonlinear systems," *J. Diff. Equations* **12** (1972), pp. 95-116.
2. "Orbits of families of vector fields and integrability of distributions," *Trans. Amer. Math. Soc.* **180** (1973), pp. 171-188.
3. "On quotients of manifolds: a generalization of the closed subgroup theorem," *Bull. Amer. Math. Soc.* **80** (1974), pp. 573-575.
4. "A generalization of the closed subgroup theorem to quotients of arbitrary manifolds," *J. Diff. Geometry* **10** (1975), pp. 151-166.
5. "Catastrophe theory," *Synthese* **31** (1975), no. 2, pp. 229-270.
6. "Existence and Uniqueness of minimal realizations of nonlinear systems," *Math. Systems Theory* **10** (1977), no. 3, pp. 263-284.
7. (with R. Zahler) "Catastrophe theory: exaggerated claims, meager accomplishements," *Nature* **269** (1977), pp. 759-763.
8. "On the gap between deterministic and stochastic differential equations," *Annals of Probability* **6** (1978), no. 1, pp. 19-41.
9. "Subanalytic sets and feedback control," *J. Diff. Equations* **31** (1979), no. 1, pp. 31-52.
10. "Analytic stratifications and control theory," in *Proceedings of the International Congress of Mathematicians (Helsinki, 1980)*, Acad. Sci. Fennica, Helsinki, 1980, pp. 865-871.
11. "Lie brackets, real analyticity and geometric control theory," in *Differential Geometric Control Theory (Houghton, Mich., 1982)*, R. W. Brockett, R. S. Millman and H. J. Sussmann Eds., Progr. Math., 27, Birkhäuser Boston, Boston, Mass., 1983, pp. 1-116.
12. "Resolution of singularities and linear time-optimal control," in *Proc. 23rd IEEE Conference on Decision and Control (Las Vegas, Nevada, Dec. 1984)*, IEEE publications, New York, 1984, pp. 1043-1046.
13. "A general theorem on local controllability, *SIAM J. Control and Optimization,* **25** (1987), no. 1, pp. 158-194.
14. "Product expansions of exponential Lie series and the discretization of stochastic differential equations," in *Stochastic Differential Systems, Stochastic Control and Applications (Minneapolis, Minn., 1986)*, W. H. Fleming and P. L. Lions Eds., IMA. Vol. Math. Appl., 10, Springer-Verlag, New York-Berlin (1988), pp. 563-582.
15. "Thirty years of optimal control. Was the path unique?," in *Modern Optimal Control*, E. O. Roxin Ed., (Proceedings of the conference "Thirty years of Optimal Control," held in Kingston, R.I., in June 1988), Lecture Notes in Pure and Appl. Math., 119, Marcel Dekker, New York-Basel, 1989, pp. 359-375.
16. "On the number of memories that can be perfectly stored by a neural net with Hebb weights," *IEEE Transactions on Information Theory* **35** (1989), no. 1, pp. 174-178.
17. (with E. D. Sontag) "Backpropagation can give rise to spurious local minima even for networks without hidden layers," *Complex Systems* **3** (1989), no. 1, pp. 91-106.
18. "Real analytic desingularization and subanalytic sets: an elementary approach," *Trans. Amer. Math. Soc.* **317** (1990), no. 2, pp. 417-461.

19. "Limitations on the stabilizability of globally minimum phase systems," *IEEE Trans. Automat. Control* **AC-35** (1990), no. 1, pp. 117-119.

20. (with P. V. Kokotovic), "The peaking phenomenon and the global stabilization of nonlinear systems," *IEEE Trans. Automat. Control*, **AC-36** (1991), no. 4, pp. 424-440.

21. (with E. D. Sontag and Y. Yang) "A general result on the stabilization of linear systems using bounded controls," *IEEE Trans. Automat. Control* **39**, no. 12, (1994), pp. 2411-2425.

22. (with W. S. Liu) "Shortest paths for sub-riemannian metrics on rank-2 distributions," *Memoirs of the American Math. Society*, **118** (1995), no. 564, x+104 pp.

23. "Symmetries and integrals of motion in optimal control," In *Geometry in Nonlinear Control and Differential Inclusions,* A. Fryszkowski, B. Jakubczyk, W. Respondek, T. Rzezuchowski Eds., Banach Center Publications **32**, Institute of Mathematics of the Polish Academy of Sciences, Warsaw, Poland, 1995, pp. 379-393. (Paper selected for a featured review in *Mathematical Reviews.*)

24. (with M. Nerurkar) "Construction of minimal cocycles arising from specific differential equations," *Israel Journal of Mathematics* **100** (1997), pp. 309-326.

25. (with J. C. Willems) "300 years of optimal control: from the brachystochrone to the maximum principle," *IEEE Control Systems Magazine,* June 1997.

26. (with M. Kawski) "Noncommutative power series and formal Lie-algebraic techniques in nonlinear control theory." In: *Operators, systems and linear algebra: three decades of algebraic systems theory (Kaiserslautern, 1997)* (Proceedings of a conference in honor of Paul Fuhrmann on the occasion of his 60th birthday), U. Helmke, D. Praetzel-Wolters, E. Zerz Eds.; B. G. Teubner Stuttgart, 1997, pp 111-129.

27. "Multidifferential calculus: chain rule, open mapping and transversal intersection theorems." In *Optimal control: theory, algorithms, and applications* (proceedings of the IFIP conference held at the University of Florida, Gainesville, on February 27, 28, and March 1, 1997); W. W. Hager and P. M. Pardalos, Editors, Kluwer Academic Publishers, 1998, pp. 436-487.

28. (with Y. Chitour) "Line-integral estimates and motion planning using the continuation method." In *Essays on Mathematical Robotics* (proc. February 1993 Workshop on Robotics held at the Institute for Mathematics and its Applications (IMA) at the University of Minnesota). J. Baillieul, S. S. Sastry and H. J. Sussmann Eds., The IMA Volumes in Mathematics and its Applications, Vol. 104, Springer-Verlag, New York, 1998, pp. 91-126.

29. "Geometry and optimal control," in *Mathematical Control Theory* (a book of essays in honor of Roger W. Brockett on the occasion of his 60th birthday). J. Baillieul and J. C. Willems Eds., Springer-Verlag, New York, 1998, pp. 140-198.

30. "Some optimal control applications of real analytic stratifications and desingularization." Presented at the Symposium on Singularities on the 70th birthday of Stanislaw Łojasiewicz, held in Kraków, Poland, September 1996. The paper has appeared in *Singularities Symposium — Łojasiewiz 70*, B. Jakubczyk, W. Pawlucki and J. Stasica, Eds., Banach Center Publications, Vol. 44, Polish Academy of Sciences, Warsaw, Poland, 1998, pp. 211-232.

31. "An introduction to the coordinate-free Maximum Principle," in: *Geometry of Feedback and Optimal Control*, B. Jakubczyk and W. Respondek Eds., Monographs Textbooks Pure Appl. Math., 207, Marcel Dekker, New York, 1998, pp. 463-557.

32. (with W. S. Liu) "Continuous dependence with respect to the input of trajectories of control-affine systems." *SIAM J. Control and Optimization* **37** (1999), pp. 777-803.

33. "A nonsmooth hybrid maximum principle." In *Stability and Stabilization of Nonlinear Systems*, D. Aeyels, F. Lamnabhi-Lagarrigue and A. J. van der Schaft Eds. (Proceedings of the First European Community Nonlinear Control Network Workshop on "Stability and Stabilization," held in Ghent, Belgium, on March 15-16, 1999.) Lect. Notes Control and Information Sciences, no. 246, Springer-Verlag, 1999, pp. 325–354.