

Curriculum Vitae  
Joel Spruck

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Education:

1967 Columbia University B.S.  
1969 Stanford University M.S.  
1971 Stanford University Ph.D. (Thesis Advisor: Robert Finn)  
"Infinite boundary value problems for surfaces of constant mean curvature."

Professional Employment:

1971-72 Postdoctoral Fellow, University of New Mexico  
1972-74 Courant Instructor of Mathematical Sciences  
1974-75 Assistant Professor, University of Minnesota  
1975-76 Associate Professor, University of Minnesota  
1977-78 Visiting Member, Courant Institute  
1977-78 Associate Professor, Brooklyn College  
1979-83 Professor, Brooklyn College  
1984-92 Professor, University of Massachusetts  
1992-96, Professor, Johns Hopkins University  
1996-1999 Professor and Chair, Johns Hopkins University  
2000- Professor, Johns Hopkins University

Honors and Awards:

Invited Address, 1994 International Congress of Mathematics, Zurich  
Annales Institute Henri Poincare Prize, Best paper 1994 (with Y. Yang)  
Guggenheim Fellowship 1999-2000  
Simons Sabbatical Fellow in Mathematics, 2012-2013  
Elected AMS Fellow Fall 2012

Publications:

1. The Plateau problem for surfaces of prescribed mean curvature in a cylinder, *Inventiones Math* 13 (1971) 169-178 (with Robert Gulliver).
2. Infinite boundary value problems for surfaces of constant mean curvature, *Arch. Rat.Mech. Anal.* 49 (1972) 1-31.
3. Surfaces of constant mean curvature which have a simple projection, *Math. Z.* 129(1972) 95-107 (with Robert Gulliver).
4. An a priori estimate for the Gauss curvature of nonparametric surfaces of constant mean curvature, *Proc. A.M.S.* 36 (1972) 217-223.

5. Existence theorems for parametric surfaces of prescribed mean curvature, *Indiana Math. Jour.* 22 (1972) 445-472 (with Robert Gulliver).
6. On the radius of the smallest ball containing a compact manifold of positive curvature, *J. Dif. Geom.* 8 (1973) 257-258.
7. A Sobolev inequality for Riemannian submanifolds, *Differential Geometry (Proc. Sympos. Pure Math Vol. XXVII, Stanford Univ. Stanford Ca. 1973) Part 1*, 139-141. AMS, Providence R.I 1975 (with David Hoffman).
8. Sobolev and isoperimetric inequalities for Riemannian submanifolds, *C.P.A.M.* 27 (1974) 715-727 (with David Hoffman).
9. A correction to "Sobolev and isoperimetric inequalities for Riemannian submanifolds", *C.P.A.M* 28 (1975) 765-766 (with David Hoffman).
10. Gauss curvature estimates for surfaces of constant mean curvature, *C.P.A.M.* 27 (1974), 547-557.
11. On the existence of a capillary surface with prescribed contact angle, *C.P.A.M.* 28 (1975) 189-200.
12. Remarks on the stability of minimal submanifolds of  $R^n$ , *Math. Z.* 144 (1975) 169-174.
13. Existence and regularity of a capillary surface with prescribed contact angle, *Arch. Rat. Mech. Anal.* 61 (1976) 19-34 (with Leon Simon).
14. On embedded minimal surfaces, *Annals of Math.* 103 (1976) 331-347 (with Robert Gulliver).
15. Correction to "On embedded minimal surfaces", *Ann. of Math.* 109 (1979) 407-412 (with R. Gulliver).
16. The shape and smoothness of stable plasma configurations, *Annali di Pisa* (1978) 1-18 (with David Kinderlehrer).
17. Regularite dans les problemes elliptiques frontiere libre. (French) *C.R. Acad. Sci. Paris Series A-B* 286(1978) A1187-A1190 (with D. Kinderlehrer and L. Nirenberg).
18. Regularity in elliptic free boundary problems, *Proc. of the Intern. Sympos. on Recent methods in Nonlinear Analysis, Rome 1978* edited by Degiorgi, Magenes and Mosco, 73-78.
19. Regularity in elliptic free boundary problems I, *Journal d'Analyse* (1979) 86-119 (with David Kinderlehrer and Louis Nirenberg).
20. Regularity in elliptic free boundary problems II, *Annali di Pisa* (1980) 637-683 (with David Kinderlehrer and Louis Nirenberg).
21. Global and local behavior of positive solutions of nonlinear elliptic equations, *C.P.A.M.* (1981) 525-598 (with B. Gidas).
22. A priori bounds for positive solutions of nonlinear elliptic equations, *1 Communications in P.D.E.* (1981) 883-901 (with B. Gidas).
23. Convexity properties of solutions to some classical variational problems, *Communications in P.D.E.* (1982) 1337-1379 (with L. Caffarelli).
24. On multimeron solutions to the Yang-Mills equations, *Communications in Math. Physics* 87 (1983) 485-495 (with L. Caffarelli and B. Gidas).
25. On a problem of a best insulator, *Institute Mittag-Leffler Report No. 3*, (1986) 42 pages (with N. Aguilera and L. Caffarelli).
26. The Dirichlet Problem for Nonlinear Second-Order Elliptic Equations I. Monge-Ampere Equations, *C.P.A.M.* (1984) 369-402 (with L. Caffarelli and L. Nirenberg).
27. The Dirichlet Problem for Nonlinear Second-Order Elliptic Equations II, Complex Monge-Ampere, and Uniformly Elliptic Equations, *C.P.A.M.* 38 (1985) 209-252 (with L. Caffarelli, J.J. Kohn, L. Nirenberg).
28. Uniqueness in a diffusion model of population biology, *Communications in P.D.E.* 8

(1983) 1605-1620.

29. The Dirichlet Problem for Nonlinear Second-Order Elliptic Equations III, Functions of the Eigenvalues of the Hessian, *Acta Math.* 155 (1985) 261-301 (with L. Caffarelli and L. Nirenberg)
30. Nonlinear Second Order Elliptic Equations IV, Starshaped Compact Weingarten Hypersurfaces. *Current Topics in P.D.E.* (1986) 1-26 (with L. Caffarelli and L. Nirenberg).
31. The Dirichlet Problem for the Degenerate Monge-Ampere Equation, *Revista Math. Iber.* 2 (1986) 19-27 (with L. Caffarelli and L. Nirenberg).
32. On a form of Bernstein's theorem, *Analyse Mathematique Aet Applications* (1988), Gauthier-Villars, Paris (with L. Caffarelli and L. Nirenberg).
33. Nonlinear Second Order Elliptic Equations V. The Dirichlet Problem for Elliptic Weingarten Surfaces, *C.P.A.M.* 41 (1988) 47-70 (with L. Caffarelli and L. Nirenberg).
34. The inverse power method for semilinear elliptic equations, *Nonlinear Defusion Problems Vol. 1, MSRI Series #12*, Springer-Verlag (1988) (with A. Eydeland).
35. On the global structure of solutions to some semilinear elliptic problems. *Theory and Applications of Liquid Crystals Vol. 5, IMA volumes in Math and Applications*, Springer-Verlag, 325-353.
36. The Elliptic Sinh-Gordon Equation and the Construction of Toroidal Soap Bubbles. *Calculus of Variations and Partial Diferential Equations*, *Proc. Trento* (1989), Springer Lecture Notes in Math #1340.
37. An Optimization Problem in Heat Conduction, *Ann. Scuola Norm. Sup. Pisa* (1988) 355-387 (with N. Aguilera and L. Caffarelli).
38. Asymptotic Symmetry and Local Behavior of Semilinear Elliptic Equations with Critical Sobolev Growth, *C.P.A.M.* 42 (1989) 271-297 (with L. Caffarelli and B. Gidas).
39. Variational Problems with Critical Sobolev Growth and Positive Dirichlet Data, *Indiana University Math. J.* 39 (1990) 1-18 (with L. Caffarelli).
40. Computational methods for multiconstrained variational problems arising in magneto-hydrodynamics, *Proc. of the Fifth international Conference on Numerical Methods in Engineering*, Vol 1,2 (Lausanne1989), 553-558 (with A. Eydeland and B. Turkington).
41. Multi-Constrained Variational Problems of Nonlinear Eigenvalue Type: New Formulations and Algorithms, *Mathematics of Computation* 55 (1990) 509-535 (with A. Eydeland and B. Turkington).
42. Motion of Level Sets by Mean Curvature I, *J. Dif. Geom.* 33 (1991) 635-681 (with L.C. Evans).
43. Motion of Level Sets by Mean Curvature II, *Trans. AMS* 330 (1992) 321-332 (with L.C. Evans).
44. Multiconstrained Variational Problems in Magnetohydrodynamics, Equilibrium, and Slow Evolution, *J. Comput. Phys.* 109 (1993), 269-285 (with A. Eydeland, A. Lifschitz and B. Turkington).
45. Motion of Level Sets by Mean Curvature III, *J. Geometric Analysis* (1992) 121-150 (with L.C. Evans).
46. Boundary Value Problems for Surfaces of Constant Gauss Curvature, *Comm. in Pure and Applied Math.* 45 (1992) 1051-1062 (with D. Hoffman and H. Rosenberg).
47. On Multivortices in the Electroweak Theory I: Existence of Periodic Vortices, *Comm. in Math. Physics.* 144 (1992) 1-16 (with Y. Yang).
48. On Multivortices in the Electroweak Theory II: Existence of Bogomol'nyi solutions in  $R^3$ , *Comm. in Math. Physics* 144 (1992) 215-234 (with Y. Yang).
49. Interior gradient estimates for solutions of prescribed curvature equations of parabolic type, *Indiana U. Math J.* (1992) (with Bo Guan).

50. Topological Solutions in the Self-Dual Chern-Simons Theory, *Annales de L'Institut Henri Poincare Analyse non lineaire* 12 (1995) 75-97 (with Y. Yang).
51. Boundary value problems on  $S$  for surfaces of constant Gauss curvature, *Annals of Math.* 138 (1993) 601-624 (with Bo Guan).
52. Motion of Level Sets by Mean Curvature IV, *J. Geom. Anal.* 5(1995)77-114 (with L.C. Evans).
53. The Existence of Nontopological Solitons in the Self-dual Chern-Simons Theory, *Comm. in Math. Physics* 149 (1992) 361-376 (with Y. Yang).
54. Multiconstrained Variational Problems in Magnetohydrodynamics; Equilibrium and Slow Evolution, *J. of Computational Physics* 106 (1993) 269-285.
55. Variational problems and Free Boundary Problems, IMA 53, Springer-Verlag, Avner Friedman and Joel Spruck editors.
56. Regular stationary solutions of the cylindrically symmetric Einstein matter gauge equations, *Journal of Math. Anal. and Apps.* 195 (1995) 160-190 (with Y. Yang).
57. On the existence of convex hypersurfaces of constant Gauss curvature in hyperbolic space, *J. Differential Geom.* 40 (1994) 379-409 (with Harold Rosenberg).
58. On the existence of constant mean curvature hypersurfaces in hyperbolic space with prescribed asymptotic boundary, 60th Birthday volume for S. Hildebrandt, Springer-Verlag, Berlin 1996, J. Jost editor (with Barbara Nelli).
59. Curvature Flows and Related topics. *Proc. of the Second Intern. Conf. (Levico, 1994)* edited by A. Damlamian, J. Spruck and A. Visintin, GAKUTO Intern. Series Math. Sciences and Applications, Tokyo 1995.
60. Existence theorems for periodic nonrelativistic Maxwell-Chern-Simons solitons, *J. Dif. Equations* 127 (1996) 571-589 (with Y. Yang).
61. Fully nonlinear elliptic equations and applications to geometry, *Proc. Int. Congress of Math. Zurich 1994*, 1145-1152, Birkhauser Verlag Switzerland 1995.
62. Multiple instantons representing higher-order-Chern Portyagin classes, *Comm. in Math. Physics* 188(1997), 737-751 (with D.H. Tchrakian and Y. Yang).
63. Strictly convex curves, convex hulls and surfaces of positive Gauss curvature, *Progress in Partial Differential Equations II*, Pitman Research Notes in Math. 1998.
64. Hypersurfaces of constant mean curvature in hyperbolic space with prescribed asymptotic boundary at infinity (with Bo Guan), *American J. Math* 122 (2000), 1039-1060.
65. Two dimensional minimal graphs over unbounded domains, *J. Inst. Math. Jussieu* 1, (2002), 631-640.
66. The existence of hypersurfaces of constant Gauss curvature with prescribed boundary (with Bo Guan), *J. Dif. Geom.* 62 (2002), 259-287.
67. Locally convex hypersurfaces of constant curvature with boundary (with Bo Guan), *Comm. Pure Appl. Math.* 57 (2004), 1311-1331.
68. A Bernstein theorem on a Randers space (with M. Souza and K. Tenenblat), *Math. Annalen* 329 (2004), 291-305.
69. Geometric Aspects of the theory of Fully Non linear Elliptic Equations, 283-309, in *The Global Theory of Minimal Surfaces*, Clay Math Proc. 2, AMS Providence, RI 2005.
70. Interior gradient estimates and existence theorems for constant mean curvature graphs in  $M \times \mathbb{R}$ , *Quarterly J. Applied Math.* 3 (2007), 785-800.
71. Infinite boundary value problems for constant mean curvature graphs in  $H_2 \times \mathbb{R}$  and  $S \times \mathbb{R}$ , (with L. Hauswirth and H. Rosenberg) *American J. Math.* 131 (2009), 195-226.
72. On complete mean curvature surfaces in  $H \times \mathbb{R}$  (with L. Hauswirth and H. Rosenberg), *Comm. Anal. Geom.* 16 (2008), 989-1005.

73. Rearrangements and radial graphs of constant mean curvature in hyperbolic space (with Daniela De Silva), *Calculus of Variations and PDE.* 34 (2009), 73-95.
74. Proof of the Julia-Zee theorem (with Y. Yang), *Comm. Math. Physics* 291 (2009), 347-356.
75. Hypersurfaces of constant curvature in hyperbolic space I (with B. Guan and M. Sza-piel), *J. Geom. Anal.* 19 (2009), 772-795.
76. Hypersurfaces of constant curvature in hyperbolic space II (with B. Guan), *J. Eur. Math. Soc. (JEMS)* 12 (2010), 797-817.
77. Charged cosmological dust solutions of the coupled Einstein-Maxwell equations (with Y. Yang), *Discrete Contin. Dyn. Syst.* 28 (2010), 797-817.
78. Convex hypersurfaces of constant curvature in hyperbolic space (with Bo Guan), *ALM* 20 (2011), 241-257, *Surveys in Geometric Analysis and Relativity* (in honor of Richard Schoen), Higher Education Press.
79. Convex spacelike hypersurfaces of constant curvature in De Sitter space (with Ling Xiao), *Discrete and Continuous Dynamical Systems Series B*, 2012.
80. The half space property and entire positive minimal graph in  $M \times \mathbb{R}$  (with H. Rosenberg and F. Shultze), *Journal of Differential Geom.* 95 (2013), 321-336. 2225-2242.
81. Interior curvature estimates and The Asymptotic Plateau problem in Hyperbolic space (with B. Guan and L. Xiao), to appear *Journal of Differential Geom.* 96 (2014), 201-222.
- 82.. Apriori estimates for stable solutions of semilinear elliptic equations, (with X. Cabre' and M. Sanchon), to appear in *Discrete and Continuous Dynamical Systems*.
83. Entire downward translating solitons to the mean curvature flow in Minkowski space, (with L. Xiao), preprint.
84. A note on starshaped compact hypersurfaces with prescribed scalar curvature in space forms, (with L. Xiao), preprint.