

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 Hofman).
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. Cafarelli 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 difusion 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. Visitin, 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 Portryagin 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 Diferential 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  $\perp$  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. Szapiel), *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.