

## Bibliography

1. U. Abresch and J. Langer, *The normalized curve shortening flow and homothetic solutions*, J. Diff. Geom. **23** (1986), no. 2, 175–196.
2. F. J. Almgren, J. E. Taylor, and L. Wang, *Curvature driven flows: a variational approach*, SIAM J. Control Opt. **31** (1993), 387–438.
3. S. J. Altschuler, *Singularities of the curve shrinking flow for space curves*, J. Diff. Geom. **34** (1991), no. 2, 491–514.
4. S. J. Altschuler, S. Angenent, and Y. Giga, *Mean curvature flow through singularities for surfaces of rotation*, J. Geom. Anal. **5** (1995), no. 3, 293–358.
5. S. J. Altschuler and M. Grayson, *Shortening space curves and flow through singularities*, J. Diff. Geom. **35** (1992), 283–298.
6. L. Ambrosio, *Geometric evolution problems, distance function and viscosity solutions*, Calculus of variations and partial differential equations (Pisa, 1996), Springer-Verlag, Berlin, 2000, pp. 5–93.
7. L. Ambrosio and H. M. Soner, *A level set approach to the evolution of surfaces of any codimension*, J. Diff. Geom. **43** (1996), 693–737.
8. B. Andrews, *Flow of hypersurfaces by curvature functions*, Workshop on theoretical and numerical aspects of geometric variational problems (Canberra, 1990), Proc. Centre Math. Appl. Austral. Nat. Univ., vol. 26, Austral. Nat. Univ., Canberra, 1991, pp. 1–10.
9. ———, *Contraction of convex hypersurfaces in Euclidean space*, Calc. Var. Partial Differential Equations **2** (1994), no. 2, 151–171.
10. ———, *Non-collapsing in mean-convex mean curvature flow*, Unpublished work, 2009.
11. B. Andrews and C. Baker, *Mean curvature flow of pinched submanifolds to spheres*, J. Diff. Geom. **85** (2010), no. 3, 357–395.
12. B. Andrews and P. Bryan, *Curvature bound for curve shortening flow via distance comparison and a direct proof of Grayson’s theorem*, ArXiv Preprint Server – <http://arxiv.org>, 2009.
13. S. Angenent, *The zero set of a solution of a parabolic equation*, J. Reine Angew. Math. **390** (1988), 79–96.
14. ———, *Parabolic equations for curves on surfaces. I. Curves with  $p$ -integrable curvature*, Ann. of Math. (2) **132** (1990), no. 3, 451–483.
15. ———, *On the formation of singularities in the curve shortening flow*, J. Diff. Geom. **33** (1991), 601–633.
16. ———, *Parabolic equations for curves on surfaces. II. Intersections, blow-up and generalized solutions*, Ann. of Math. (2) **133** (1991), no. 1, 171–215.
17. ———, *Shrinking doughnuts*, Nonlinear diffusion equations and their equilibrium states, 3 (Gregynog, 1989), Progr. Nonlinear Differential Equations Appl., vol. 7, Birkhäuser Boston, Boston, MA, 1992, pp. 21–38.
18. S. Angenent, T. Ilmanen, and D. L. Chopp, *A computed example of nonuniqueness of mean curvature flow in  $\mathbb{R}^3$* , Comm. Partial Differential Equations **20** (1995), no. 11–12, 1937–1958.
19. S. Angenent and J. J. L. Velázquez, *Degenerate neckpinches in mean curvature flow*, J. Reine Angew. Math. **482** (1997), 15–66.
20. T. Aubin, *Some nonlinear problems in Riemannian geometry*, Springer-Verlag, 1998.
21. K. A. Brakke, *The motion of a surface by its mean curvature*, Princeton University Press, NJ, 1978.
22. B.-L. Chen and L. Yin, *Uniqueness and pseudolocality theorems of the mean curvature flow*, Comm. Anal. Geom. **15** (2007), no. 3, 435–490.
23. Y. G. Chen, Y. Giga, and S. Goto, *Uniqueness and existence of viscosity solutions of generalized mean curvature flow equations*, J. Diff. Geom. **33** (1991), 749–786.
24. D. L. Chopp, *Computation of self-similar solutions for mean curvature flow*, Experiment. Math. **3** (1994), no. 1, 1–15.
25. K.-S. Chou and X.-P. Zhu, *Shortening complete plane curves*, J. Diff. Geom. **50** (1998), no. 3, 471–504.
26. ———, *The curve shortening problem*, Chapman & Hall/CRC, Boca Raton, FL, 2001.
27. B. Chow, S.-C. Chu, D. Glickenstein, C. Guenther, J. Isenberg, T. Ivey, D. Knopf, P. Lu, F. Luo, and L. Ni, *The Ricci flow: techniques and applications. Part II. Analytic aspects*, Mathematical Surveys and Monographs, vol. 144, American Mathematical Society, Providence, RI, 2008.
28. T. H. Colding and W. P. Minicozzi II, *Sharp estimates for mean curvature flow of graphs*, J. Reine Angew. Math. **574** (2004), 187–195.
29. ———, *Generic mean curvature flow I; generic singularities*, ArXiv Preprint Server – <http://arxiv.org>, 2009.
30. T. H. Colding and B. Kleiner, *Singularity structure in mean curvature flow of mean-convex sets*, Electron. Res. Announc. Amer. Math. Soc. **9** (2003), 121–124 (electronic).
31. P. Daskalopoulos, R. S. Hamilton, and N. Sesum, *Classification of compact ancient solutions to the curve shortening flow*, J. Diff. Geom. **84** (2010), no. 3, 455–464.

32. C. Dellacherie and P.-A. Meyer, *Probabilities and potential*, North-Holland Mathematics Studies, vol. 29, North-Holland Publishing Co., Amsterdam, 1978.
33. D. M. DeTurck, *Deforming metrics in the direction of their Ricci tensors*, J. Diff. Geom. **18** (1983), no. 1, 157–162.
34. K. Ecker, *Lectures on geometric evolution equations*, Instructional Workshop on Analysis and Geometry, Part II (Canberra, 1995), Proc. Centre Math. Appl. Austral. Nat. Univ., vol. 34, Austral. Nat. Univ., Canberra, 1996, pp. 79–107.
35. ———, *Regularity theory for mean curvature flow*, Progress in Nonlinear Differential Equations and their Applications, 57, Birkhäuser Boston Inc., Boston, MA, 2004.
36. ———, *A formula relating entropy monotonicity to Harnack inequalities*, Comm. Anal. Geom. **15** (2007), no. 5, 1025–1061.
37. K. Ecker and G. Huisken, *Mean curvature flow of entire graphs*, Ann. of Math. (2) **130** (1989), 453–471.
38. ———, *Interior estimates for hypersurfaces moving by mean curvature*, Invent. Math. **105** (1991), no. 3, 547–569.
39. M. Eminenti, *Alcune proprietà della funzione distanza da una sottovarietà e una congettura di Ennio De Giorgi*, Unpublished, 2004.
40. C. L. Epstein and M. I. Weinstein, *A stable manifold theorem for the curve shortening equation*, Comm. Pure Appl. Math. **40** (1987), no. 1, 119–139.
41. L. C. Evans and R. F. Gariepy, *Lectures notes on measure theory and fine properties of functions*, CRC Press, Ann Arbor, 1992.
42. L. C. Evans and J. Spruck, *Motion of level sets by mean curvature I*, J. Diff. Geom. **33** (1991), 635–681.
43. ———, *Motion of level sets by mean curvature II*, Trans. Amer. Math. Soc. **330** (1992), no. 1, 321–332.
44. A. Fasano and S. Marmi, *Analytical dynamics: an introduction*, Oxford Graduate Texts, 2006.
45. A. Friedman, *Partial differential equations of parabolic type*, Prentice-Hall Inc., Englewood Cliffs, NJ, 1964.
46. M. Gage, *An isoperimetric inequality with applications to curve shortening*, Duke Math. J. **50** (1983), no. 4, 1225–1229.
47. ———, *Curve shortening makes convex curves circular*, Invent. Math. **76** (1984), 357–364.
48. M. Gage and R. S. Hamilton, *The heat equation shrinking convex plane curves*, J. Diff. Geom. **23** (1986), 69–95.
49. S. Gallot, D. Hulin, and J. Lafontaine, *Riemannian geometry*, Springer-Verlag, 1990.
50. Y. Giga, *Surface evolution equations. A level set approach*, Monographs in Mathematics, vol. 99, Birkhäuser, Basel, 2006.
51. M. A. Grayson, *The heat equation shrinks embedded plane curves to round points*, J. Diff. Geom. **26** (1987), 285–314.
52. ———, *A short note on the evolution of surfaces via mean curvature*, Duke Math. J. **58** (1989), 555–558.
53. ———, *Shortening embedded curves*, Ann. of Math. (2) **129** (1989), 71–111.
54. C. Gui, H. Jian, and H. Ju, *Properties of translating solutions to mean curvature flow*, Discrete Contin. Dyn. Syst. **28** (2010), no. 2, 441–453.
55. R. S. Hamilton, *Three-manifolds with positive Ricci curvature*, J. Diff. Geom. **17** (1982), no. 2, 255–306.
56. ———, *Four-manifolds with positive curvature operator*, J. Diff. Geom. **24** (1986), no. 2, 153–179.
57. ———, *The Harnack estimate for the Ricci flow*, J. Diff. Geom. **37** (1993), no. 1, 225–243.
58. ———, *A matrix Harnack estimate for the heat equation*, Comm. Anal. Geom. **1** (1993), no. 1, 113–126.
59. ———, *Monotonicity formulas for parabolic flows on manifolds*, Comm. Anal. Geom. **1** (1993), no. 1, 127–137.
60. ———, *Convex hypersurfaces with pinched second fundamental form*, Comm. Anal. Geom. **2** (1994), no. 1, 167–172.
61. ———, *The formation of singularities in the Ricci flow*, Surveys in differential geometry, Vol. II (Cambridge, MA, 1993), Int. Press, Cambridge, MA, 1995, pp. 7–136.
62. ———, *The Harnack estimate for the mean curvature flow*, J. Diff. Geom. **41** (1995), no. 1, 215–226.
63. ———, *Isoperimetric estimates for the curve shrinking flow in the plane*, Modern methods in complex analysis (Princeton, NJ, 1992), Princeton University Press, NJ, 1995, pp. 201–222.
64. ———, *Four-manifolds with positive isotropic curvature*, Comm. Anal. Geom. **5** (1997), no. 1, 1–92.
65. G. Huisken, *Flow by mean curvature of convex surfaces into spheres*, J. Diff. Geom. **20** (1984), 237–266.
66. ———, *Nonparametric mean curvature evolution with boundary conditions*, J. Diff. Eqs. **77** (1989), no. 2, 369–378.
67. ———, *Asymptotic behavior for singularities of the mean curvature flow*, J. Diff. Geom. **31** (1990), 285–299.
68. ———, *Local and global behaviour of hypersurfaces moving by mean curvature*, Proc. Sympos. Pure Math **54** (1993), 175–191.
69. ———, *Lectures on geometric evolution equations*, Tsing Hua lectures on geometry & analysis (Hsinchu, 1990–1991), Int. Press, Cambridge, MA, 1997, pp. 117–143.
70. ———, *A distance comparison principle for evolving curves*, Asian J. Math. **2** (1998), 127–133.
71. ———, *Evolution of hypersurfaces by their curvature in Riemannian manifolds*, Proceedings of the International Congress of Mathematicians, Vol. II (Berlin, 1998), no. Extra Vol. II, 1998, pp. 349–360 (electronic).
72. G. Huisken and A. Polden, *Geometric evolution equations for hypersurfaces*, Calculus of variations and geometric evolution problems (Cetraro, 1996), Springer-Verlag, Berlin, 1999, pp. 45–84.
73. G. Huisken and C. Sinestrari, *Convexity estimates for mean curvature flow and singularities of mean convex surfaces*, Acta Math. **183** (1999), no. 1, 45–70.
74. ———, *Mean curvature flow singularities for mean convex surfaces*, Calc. Var. Partial Differential Equations **8** (1999), no. 1, 1–14.
75. ———, *Mean curvature flow with surgeries of two-convex hypersurfaces*, Invent. Math. **175** (2009), no. 1, 137–221.
76. N. Hungerbühler and K. Smoczyk, *Soliton solutions for the mean curvature flow*, Differential Integral Equations **13** (2000), no. 10–12, 1321–1345.
77. T. Ilmanen, *Convergence of the Allen-Cahn equation to Brakke’s motion by mean curvature*, J. Diff. Geom. **38** (1993), 417–461.

78. ———, *Elliptic regularization and partial regularity for motion by mean curvature*, Mem. Amer. Math. Soc., vol. 108(520), AMS, 1994.
79. ———, *Singularities of mean curvature flow of surfaces*, <http://www.math.ethz.ch/~ilmanen/papers/sing.ps>, 1995.
80. ———, *Lectures on mean curvature flow and related equations*, <http://www.math.ethz.ch/~ilmanen/papers/notes.ps>, 1998.
81. N. Ishimura, *Shape of spirals*, Tohoku Math. J. **50** (1998), no. 2, 197–202.
82. E. M. Landis, *Second order equations of elliptic and parabolic type*, Translations of Mathematical Monographs, vol. 171, American Mathematical Society, Providence, RI, 1998, Translated from the 1971 Russian original by Tamara Rozhkovskaya, With a preface by Nina Ural'tseva.
83. J. Langer, *A compactness theorem for surfaces with  $L_p$ -bounded second fundamental form*, Math. Ann. **270** (1985), 223–234.
84. N. Q. Le and N. Sesum, *On the extension of the mean curvature flow*, ArXiv Preprint Server – <http://arxiv.org>, 2009.
85. ———, *The mean curvature at the first singular time of the mean curvature flow*, Ann. Inst. H. Poincaré Anal. Non Linéaire **27** (2010), no. 6, 1441–1459.
86. P. Li and S.-T. Yau, *On the parabolic kernel of the Schrödinger operator*, Acta Math. **156** (1986), no. 3–4, 153–201.
87. J. L. Lions and E. Magenes, *Non-homogeneous boundary value problems and applications. Vol. I*, Springer-Verlag, New York, 1972.
88. A. Lunardi, *Analytic semigroups and optimal regularity in parabolic problems*, Birkhäuser, Basel, 1995.
89. L. Lusternik and L. Schnirelman, *Sur le problème de trois géodesiques fermées sur les surfaces de genre 0*, C. R. Acad. Sci. Paris **189** (1929), 269–271.
90. C. Mantegazza and L. Martinazzi, *A note on quasilinear parabolic equations on manifolds*, Ann. Sc. Norm. Sup. Pisa **11** (5) (2012), 857–874.
91. M. Marcus and L. Lopes, *Inequalities for symmetric functions and Hermitian matrices*, Canad. J. Math. **9** (1957), 305–312.
92. S. Mukhopadhyaya, *New methods in the geometry of a plane arc*, Bull. Calcutta Math. Soc. **1** (1909), 21–27.
93. R. Müller, *Differential Harnack inequalities and the Ricci flow*, EMS Series of Lectures in Mathematics, European Mathematical Society (EMS), Zürich, 2006.
94. W. M. Mullins, *Two-dimensional motion of idealized grain boundaries*, J. Appl. Phys. **27** (1956), 900–904.
95. X. H. Nguyen, *Construction of complete embedded self-similar surfaces under mean curvature flow. I*, Trans. Amer. Math. Soc. **361** (2009), no. 4, 1683–1701.
96. ———, *Translating tridents*, Comm. Partial Differential Equations **34** (2009), no. 1–3, 257–280.
97. ———, *Complete embedded self-translating surfaces under mean curvature flow*, ArXiv Preprint Server – <http://arxiv.org>, 2010.
98. ———, *Construction of complete embedded self-similar surfaces under mean curvature flow. II*, Adv. Differential Equations **15** (2010), no. 5–6, 503–530.
99. S. Osher and J. Sethian, *Fronts propagating with curvature-dependent speed: algorithms based on Hamilton–Jacobi formulations*, J. Comput. Phys. **79** (1988), no. 1, 12–49.
100. R. Osserman, *The four-or-more vertex theorem*, Amer. Math. Monthly **92** (1985), no. 5, 332–337.
101. M. Paolini and C. Verdi, *Asymptotic and numerical analyses of the mean curvature flow with a space-dependent relaxation parameter*, Asymptotic Anal. **5** (1992), no. 6, 553–574.
102. A. Polden, *Curves and Surfaces of Least Total Curvature and Fourth-Order Flows*, Ph.D. thesis, Mathematisches Institut, Univ. Tübingen, 1996, Arbeitsbereich Analysis Preprint Server – Univ. Tübingen, <http://poincare.mathematik.uni-tuebingen.de/mozilla/home.e.html>.
103. W. Sheng and X.-J. Wang, *Singularity profile in the mean curvature flow*, Methods Appl. Anal. **16** (2009), no. 2, 139–155.
104. W.-X. Shi, *Deforming the metric on complete Riemannian manifolds*, J. Diff. Geom. **30** (1989), no. 1, 223–301.
105. L. Simon, *Lectures on geometric measure theory*, Proc. Center Math. Anal., vol. 3, Australian National University, Canberra, 1983.
106. J. Simons, *Minimal varieties in Riemannian manifolds*, Ann. of Math. (2) **88** (1968), 62–105.
107. C. Sinestrari, *Singularities of mean curvature flow and flow with surgeries*, Surveys in differential geometry. Vol. XII. Geometric flows, vol. 12, Int. Press, Somerville, MA, 2008, pp. 303–332.
108. K. Smoczyk, *Starshaped hypersurfaces and the mean curvature flow*, Manuscripta Math. **95** (1998), no. 2, 225–236.
109. H. M. Soner, *Motion of a set by the curvature of its boundary*, J. Diff. Eqs. **101** (1993), no. 2, 313–372.
110. H. M. Soner and P. E. Souganidis, *Singularities and uniqueness of cylindrically symmetric surfaces moving by mean curvature*, Comm. Partial Differential Equations **18** (1993), 859–894.
111. P. E. Souganidis, *Front propagation: theory and applications*, Viscosity solutions and applications (Montecatini Terme, 1995), Lect. Notes in Math., vol. 1660, Springer-Verlag, Berlin, 1997, pp. 186–242.
112. A. Stahl, *Convergence of solutions to the mean curvature flow with a Neumann boundary condition*, Calc. Var. Partial Differential Equations **4** (1996), no. 5, 421–441.
113. ———, *Regularity estimates for solutions to the mean curvature flow with a Neumann boundary condition*, Calc. Var. Partial Differential Equations **4** (1996), no. 4, 385–407.
114. N. Stavrou, *Selfsimilar solutions to the mean curvature flow*, J. Reine Angew. Math. **499** (1998), 189–198.
115. A. Stone, *A density function and the structure of singularities of the mean curvature flow*, Calc. Var. Partial Differential Equations **2** (1994), 443–480.
116. ———, *Singular and Boundary Behaviour in the Mean Curvature Flow of Hypersurfaces*, Ph.D. thesis, Stanford University, 1994.

117. M.-T. Wang, *Long-time existence and convergence of graphic mean curvature flow in arbitrary codimension*, *Invent. Math.* **148** (2002), no. 3, 525–543.
118. ———, *The mean curvature flow smoothes Lipschitz submanifolds*, *Comm. Anal. Geom.* **12** (2004), no. 3, 581–599.
119. X.-J. Wang, *Convex solutions to the mean curvature flow*, ArXiv Preprint Server – <http://arxiv.org>, to appear on *Ann. of Math.*, 2004.
120. B. White, *The size of the singular set in mean curvature flow of mean-convex sets*, *J. Amer. Math. Soc.* **13** (2000), no. 3, 665–695 (electronic).
121. ———, *Evolution of curves and surfaces by mean curvature*, *Proceedings of the International Congress of Mathematicians, Vol. I (Beijing, 2002)*, 2002, pp. 525–538.
122. ———, *The nature of singularities in mean curvature flow of mean-convex sets*, *J. Amer. Math. Soc.* **16** (2003), no. 1, 123–138 (electronic).
123. ———, *A local regularity theorem for mean curvature flow*, *Ann. of Math. (2)* **161** (2005), no. 3, 1487–1519.
124. H. Wu, *Manifolds of partially positive curvature*, *Indiana Univ. Math. J.* **36** (1987), no. 3, 525–548.
125. A. A. Zevin and M. A. Pinsky, *Monotonicity criteria for an energy-period function in planar Hamiltonian systems*, *Nonlinearity* **14** (2001), no. 6, 1425–1432.
126. X.-P. Zhu, *Lectures on mean curvature flows*, *AMS/IP Studies in Advanced Mathematics*, vol. 32, American Mathematical Society, Providence, RI, 2002.