

C.M.Elliott Publications:

Books

1. (with J.R. Ockendon) *Weak and variational methods for moving boundary problems*. Pitman, London 213 pp (1982).
2. (with S. McKee, co-editor) *Industrial Numerical Analysis*. Clarendon Press, Oxford 256pp (1986).

Research Articles in Conference Proceedings and Collections: some refereed*

3. *Moving boundary problems and linear complementarity*. Numerische Behandlung von Differential-Gleichungen etc., ed. Albrecht, Collatz and Hammerlin, ISNM**39** (1978).
4. (with V. Janovsky) *A finite element discretisation of a variational inequality formulation of a Hele-Shaw moving boundary problem*. MAFELAP 1978, ed. J.R. Whiteman, (1979) 97-106.
5. (with C.J. Mason) *A weak solution method for a class of free boundary problems*. Numerical Treatment of Free Boundary Value Problems (eds. J. Albrecht, L. Collatz, and K.H. Hoffman), I.S.N.M. Birkhauser Verlag, Basel (1982) 66-72.
6. *A variational inequality formulation of a steady state electrochemical machining free boundary problem*. Free Boundary Problems, Theory & Applications, (eds. A. Fasano and M. Primicerio), Pitman, London, (1983).
7. (with J.W. Barrett) *A finite element method on a fixed mesh for the Stefan problem with convection in a saturated porous medium*. Numerical Methods for Fluid Dynamics (eds. K.W. Morton and M.J. Baines) Academic Press, London (1982) 389-409.
8. (with B. Count) *Analysis of a wave power device*. Industrial Numerical Analysis (1986) (see [2]) 124-142.
9. **The Cahn-Hilliard model for the kinetics of phase separation*. 'Mathematical Models for Phase Change Problems'. ed. J.F.Rodrigues, International Series of Numerical Mathematics **88**, Birkhauser Verlag (1989) 35-73.
10. (with A. Mikelic) *Some numerical experiments with the Cahn-Hilliard phase separation model with non-differentiable energy*. Pitman Research Notes in Mathematics **186** 589-598 Longman (1990).
11. (with J.W. Barrett) *Finite element approximation of a free boundary problem related to plasma physics*. Pitman Research Notes in Mathematics **186** 567-573 Longman (1990).

12. (with J.F. Blowey) *Curvature dependent phase boundary motion and parabolic double obstacle problems*. I.M.A. **47** (1993) 19-60, 'Degenerate Diffusions' ed. Wei-Ming Ni, L.A. Peletier and J.L. Vazquez. Springer Verlag, New York.
13. (with J.F. Blowey) *A phase field model with a double obstacle potential*. (1994)'Motion by mean curvature', ed. G. Buttazzo and A. Visintin, de Gruyter, 1-22.
14. *(with A.R. Gardiner) *One dimensional phase field computations*. Numerical Analysis 1993. Proceedings of Dundee Conference. ed. D.F. Griffiths and G.A. Watson. Longman Scientific and Technical, (1994) 56-74.
15. *(with A.R. Gardiner, I. Kostin, B. Lu) *Mathematical and numerical analysis of a mean-field equation for the Ising model with Glauber dynamics*. Contemp. Math. **172** (1994) 217-241. [Chaotic Numerics ed. P.E. Kloeden and K.J. Palmer].
16. (with A.R. Gardiner) *Numerical analysis of the phase field equations and phase boundary motion*. (1994) Computational Techniques and Applications: CTAC 93 ed. D. Stewart, H. Gardener and D. Singleton. World Scientific, 12-25.
17. **Approximation of curvature dependent interface motion*. State of the Art in Numerical Analysis (1997) ed. I.Duff, G.A.Watson. Clarendon Press, Oxford. 407-440.
18. *(with V.M. Styles) *Numerical approximation of vortex density evolution in a superconductor*. Numerical Analysis 1999. Proceedings of Dundee Conference. ed. D.F.Griffiths , G.A.Watson. Boca Raton Chapman Hall CRC Press Research Notes Maths **420** (2000) 93-114.
19. *(with A.J. Briggs, J.R. Claisse ,and V. Styles) *Computation of vorticity evolution for a cylindrical Type II superconductor subject to parallel and transverse applied magnetic field*. Numerical Methods for Viscosity Solutions and Applications. M. Falcone, C. Makridakis (eds.) Singapore World Scientific Series: Adv. Math. Appl. Sciences **59** (2001) 77-94 .

Research Reports

20. (with S. Luckhaus) *A generalised diffusion equation for phase separation of a multi-component mixture with interfacial free energy*. SFB756 University of Bonn Preprint 195 (1991)
21. (with A.R. Gardiner, T. Kühn) *Generalised double obstacle phase field approximation of the anisotropic mean curvature flow*. CMAIA Report 1996-17
22. (with A.R. Gardiner) *Double obstacle phase field computations of dendritic growth*. CMAIA Report 1996-19

23. (with K.P. Deckelnick) *Propagation of eikonal-curvature fronts in two dimensional inhomogeneous and striped media*. CMAIA Report 1997-09

Miscellaneous

24. Chapman, S.J.(ed.); Elliott, C.M.(ed.); Head, A.K.(ed.); Howison, S.D.(ed.); Leslie, F.M.(ed.); Ockendon, J.R.(ed.) *Vortices, dislocations and line singularities in partial differential equations*. Philos. Trans. R. Soc. Lond., Ser. A 355, No.1731, 1945-2072 (1997).

Academic Journal Papers

25. *On a variational inequality formulation of an electrochemical machining moving boundary problem and its approximation by the finite element method*. J. Inst. Math. Applics. **25** (1980) 121-131.
26. *On the finite element approximation of an elliptic variational inequality arising from an implicit time discretisation of the Stefan problem*. I.M.A. Journal of Numerical Analysis **1** (1981) 115-125.
27. (with V. Janovsky) *A variational inequality approach to Hele-Shaw flow with a moving boundary*. Proceedings of the Royal Society of Edinburgh **88A** (1981) 93 -107.
28. (with S. McKee) *On the numerical solution of an integrodifferential equation arising from wave power hydraulics*. B.I.T. **21** (1981) 318-325.
29. (with V. Janovsky) *An error estimate for a finite element approximation of an elliptic variational inequality formulation of a Hele-Shaw moving boundary problem*. I.M.A. Journal of Numerical Analysis **3** (1983) 1-9.
30. (with J.M. Aitchison and J.R. Ockendon) *Percolation in gently sloping beaches*. I.M.A. Journal of Applied Mathematics **30** (1983) 269-287.
31. (with J.W. Barrett) *A finite element method for solving elliptic equations with Neumann data on a curved boundary using unfitted meshes*. I.M.A. Journal of Numerical Analysis **4** (1984) 309-325.
32. (with E. Di Benedetto) *Existence for a problem in ground freezing*. Nonlinear Analysis T.M.A. **9** (1985) 953-967.
33. (with J.W. Barrett) *Fixed mesh finite element approximations to a free boundary problem for an elliptic equation with an oblique derivative boundary condition*. Comp. Math. with Appls. **11** (1985) 335-345.

34. (with A. Friedman) *The contact set of a rigid body partially supported by a membrane.* Nonlinear Analysis T.M.A. **10** (1986) 251-276.
35. *On the convergence of a one-step method for the solution of an ordinary differential inclusion.* I.M.A. Journal of Numerical Analysis **5** (1985) 3-27.
36. (with A. Friedman) *Analysis of a model of percolation in a gently sloping sand-bank.* SIAM J. Math. Anal. **16** (1985) 941-954.
37. (with E. Di Benedetto & A. Friedman) *The free boundary of a flow in a porous body heated from its boundary.* Nonlinear Analysis T.M.A. **10** (1986) 879-900.
38. *The Stefan problem with a non-monotone constitutive relation.* I.M.A. J. Appl. Math. **35** (1985) 257-264.
39. (with J.W. Barrett) *Total flux estimates for a finite element approximation of parabolic equations.* I.M.A. Journal of Numerical Analysis (1986) **6** 253-264.
40. (with J.W. Barrett) *Finite element approximation of the Dirichlet problem using the boundary penalty method.* Numer. Math. **49** (1986) 343-366.
41. (with Zheng Songmu) *On the Cahn Hilliard equation.* Arch. Rat. Mech. Anal. **96**(1986) 339-357.
42. (with M.A.Herrero, J.R. King, J.R.Ockendon) *The mesa problem:diffusion patterns for $u_t = \nabla(u\nabla u)$ as $m \rightarrow +\infty$.* I.M.A. J. Appl. Math. **37** (1986) 147-154.
43. *Error analysis of the enthalpy method for the Stefan problem.* I.M.A. Journal of Numerical Analysis **7** (1987) 61-71.
44. (with J.W. Barrett) *Total flux estimates for a finite element approximation of elliptic equations.* I.M.A. Journal of Numerical Analysis **7** (1987) 129-148.
45. (with J.W. Barrett) *A practical finite element approximation of a semi-definite Neumann problem on a curved domain.* Num. Math. **51** (1987) 23-36.
46. (with J.W. Barrett) *Fitted and unfitted finite element methods for elliptic equations with smooth interfaces.* I.M.A. Journal of Numerical Analysis **7** (1987) 283-300.
47. (with D. French) *Numerical studies of the Cahn-Hilliard equation for phase separation.* I.M.A. Journal of Applied Mathematics **38** (1987) 97-128.
48. (with J.W. Barrett) *Finite element approximation of elliptic equations with Neumann or Robin condition on a curved boundary.* I.M.A. Journal of Numerical Analysis **8** (1988) 321-342.

49. (with D. French, F. Milner) *A second order splitting method for the Cahn-Hilliard equation*. Num. Math. **54** (1989)575-590.
50. (with J.W. Barrett) *Remarks on a free boundary problem arising in the theory of liquid drops and plasma physics*. Proc. Roy. Soc. Edin. **111A** (1989) 169-181.
51. (with D. French) *A nonconforming finite element method for the two dimensional Cahn-Hilliard equation*. SIAM J. Numer. Anal. **26** (1989) 884-903.
52. (with J.W. Barrett) *Finite element approximation of a plasma problem*. IMA Journal of Numerical Analysis **9** (1989) 443-464.
53. (with M. Copetti) *Kinetics of phase decomposition processes: numerical solutions to the Cahn-Hilliard equation*. Materials Science and Technology **6** (1990) 273-283.
54. (with A. Mikelic) *Existence for the Cahn-Hilliard model of phase separation with a non-differentiable energy*. Annali Matematica Pura ed Applicata **CLVIII** (1991) 181-203.
55. (with J.W. Barrett) *Finite element approximation of a free boundary problem arising in the theory of liquid drops and plasma physics*. RAIRO, Modlisation Math. Anal. Numr. M2AN **25** (1991) 213-252.
56. (with A. Mikelic, M. Shillor) *Constrained anisotropic elastic materials in unilateral contact with or without friction*. Nonlinear Analysis T.M.A. **16** (1991) 155-181.
57. (with J.W. Barrett, R. Chakrabarti) *Finite element approximation of a rigid punch indenting a membrane*. I.M.A. Journal of Numerical Analysis.**11** (1991) 579-594.
58. (with J.F. Blowey) *The Cahn-Hilliard gradient theory for phase separation with non-smooth free energy Part 1: Mathematical Analysis*. European J. Applied Mathematics. **2** (1991) 233-280.
59. (with S. Larsson) *Error estimates with smooth and non-smooth data for a finite element method for the Cahn-Hilliard equation*. Math. Comp. **58** (1992) 603-630, S33-S36.
60. (with J.F. Blowey) *The Cahn-Hilliard gradient theory for phase separation with non-smooth free energy Part II: Numerical Analysis*. European J. Applied Mathematics **3** (1992) 147-179.
61. (with M. Copetti) *Numerical analysis of the Cahn-Hilliard equation with a logarithmic free energy*. Numer. Math.**63**, (1992) 39-65.

62. (with M. Copetti) *A one dimensional quasi-static contact problem in linear thermoelasticity*. European J. Applied Mathematics **4** (1993) 175-188.
63. (with A. Stuart) *The global dynamics of discrete semilinear parabolic equations*. SIAM J. Numer. Anal. **30** (1993) 1622-1663.
64. (with H. Matano, Q. Tang) *Zeros of a complex Ginzburg-Landau order parameter with applications to superconductivity*. European Journal Appl. Math. **5** (1994) 431-448.
65. (with X. Chen, Q. Tang) *Shooting method for vortex solutions of a complex valued Ginzberg-Landau equation*. Proc. Roy. Soc. Edin. **124A** (1994) 1075-1088.
66. (with X. Chen) *Asymptotics for a parabolic double obstacle problem*. Proc. Roy. Soc. London Ser. A. **444** (1994) 429-445.
67. (with Q. Tang) *A dynamic contact problem in thermoelasticity*. Nonlinear Analysis T.M.A. **23** (1994) 883-898.
68. (with F. Bai, A.R. Gardiner, A. Spence, A. Stuart) *The viscous Cahn-Hilliard equation Part I: Computations*. Nonlinearity **8** (1995) 131-160.
69. (with S. Larsson) *A finite element model for the time dependent Joule heating problem*. Math. Comp. **64** (1995) 1433-1453.
70. (M.K. Miller, J.M. Hyde, M.G. Hetherington, A. Cerezo, G.D.W. Smith, C.M. Elliott) *Spinodal decomposition in Fe-Cr alloys: Experimental study at the atomic level and comparison with computer models-I, Introduction and methodology*. Act. Metall. Mater. **43** (1995) 3385-3401.
71. (J.M. Hyde, M.K. Miller, M.G. Hetherington, A. Cerezo, G.D.W. Smith, C.M. Elliott) *Spinodal decomposition in Fe-Cr alloys: Experimental study at the atomic level and comparison with computer models-II, Introduction and methodology. Development of domain size and composition amplitude*. Act. Metall. Mater. **43** (1995) 3403-3413.
72. (J.M. Hyde, M.K. Miller, M.G. Hetherington, A. Cerezo, G.D.W. Smith, C.M. Elliott) *Spinodal decomposition in Fe-Cr alloys: Experimental study at the atomic level and comparison with computer models-III, Development of Morphology*. Act. Metall. Mater. **43** (1995) 3415-3426.
73. (with H. Garcke) *On the Cahn-Hilliard equation with degenerate mobility*. SIAM J. Math. Anal. **27** (1996) 404-423.
74. (with J.F. Blowey, M. Copetti,) *Numerical analysis of multi-component phase separation*. I.M.A Journal of Numerical Analysis **16** (1996) 111-139.

75. (with A. Stuart) *The viscous Cahn-Hilliard equation. Part II, Analysis.* J. Differential Equations **128** (1996) 387-414.
76. (with J. Cahn, A. Novick-Cohen) *The Cahn-Hilliard equation with a concentration dependent mobility: motion by minus the Laplacian of the mean curvature.* Euro. J. Appl. Math. **7** (1996) 287-301.
77. (with I. Kostin) *Lower semicontinuity of a non-hyperbolic attractor for the viscous Cahn-Hilliard equation.* Nonlinearity **9** (1996) 687-702.
78. (with R. Schätzle) *The limit of the anisotropic double-obstacle Allen-Cahn equation.* Proc. Roy. Soc. Edin. **126** (1996) 1217-1234.
79. (with M. Paolini, R. Schätzle) *Sharp interface estimates for the fully anisotropic double obstacle Allen-Cahn equation.* Math. Models Meth. Appl. Sci. **8** (1996) 1103-1118.
80. (with H. Garcke) *Existence results for diffusive surface motion laws.* Advances in Mathematical Sciences and Applications **7** (1997) 465-488.
81. (with R. Schätzle) *The limit of the fully anisotropic double obstacle Allen-Cahn equation in the non-smooth case.* SIAM J. Math. Anal. **28** (1997) . (1997) 273-303.
82. (with K. Deckelnick, G. Richardson) *Long time asymptotics for forced curvature flow with applications to the motion of a superconducting vortex.* Nonlinearity **10** (1997), 655-678.
83. (with H. Garcke) *Diffusional phase transitions in multicomponent systems with a concentration dependent mobility matrix.* Physica (D) **109**(1997) 242-256.
84. (with A.R. Gardiner, R. Schätzle) *Crystalline curvature flow in a variational setting.* Advances in Mathematical Sciences and Applications **8** (1998) 425-465.
85. (with Zhiming Chen, Q. Tang) *Justification of a two dimensional evolutionary Ginzburg-Landau superconductivity model.* RAIRO, Modelisation Math. Anal. Numr. M2AN **32** (1998) 25-50.
86. (with K.P.Deckelnick) *Finite element error bounds for a curve shrinking with prescribed normal contact to a fixed boundary.* IMA Journal Num. Anal. **18** (1998) 635-654.
87. (with Xinfu Chen, A.R.Gardiner and J.J.Zhao) *Convergence of numerical solutions to the Allen-Cahn equation.* Applicable Analysis **69** (1998) 47-56.
88. (with R.Schatzle and B.Stoth) *Viscosity solutions of a degenerate parabolic elliptic system arising in the mean field theory of superconductivity.* Arch. Rat. Mech. Anal. **145** (1998) 99-127.

89. (with K.P.Deckelnick) *Local and global existence results for anisotropic Hele-Shaw flows*. Proc. Roy. Soc. Edinburgh Sect. A, Math **129A** (1999) 265-294.
90. (with V.M.Styles) *Flux pinning and boundary nucleation of vorticity in a mean field model of superconducting vortices*. Interfaces and Free Boundaries **2**(2000) 143-180.
91. (with V.M.Styles) *Numerical analysis of a mean field model of superconducting vortices*. IMA Journal Num. Anal. **21** (2001) 1-51.
92. (with S. Maier-Pape) *Losing a graph with surface diffusion*. Hokkaido Math. Journal **30** (2001) 297-305.
93. (with P.C.Fife, J.Cahn) *A free boundary problem for diffusion induced grain boundary motion*. Interfaces and Free Boundaries **3** (2001) 291-336.
94. (with K.P.Deckelnick) *An existence and uniqueness result for a phase field model of diffusion induced grain boundary motion*. Proc. Roy. Soc. Edinburgh. Ser. **131A** (2001) 1323-1344.
95. (with K.P.Deckelnick and V.M. Styles) *Numerical diffusion induced grain boundary motion*. Interfaces and Free Boundaries **3** (2001) 393-414.
96. (with A.J.Briggs,JR.Claiss) *Finite difference approximation of a one dimensional Hamilton-Jacobi /elliptic system arising in superconductivity*. IMA Journal of Numerical Analysis **22** (2002) 89-131.
97. (with K. Deckelnick and V. Styles) *Analysis and computations for a model of quasi-static deformation of a thinning sheet arising in superplastic forming*. Euro. J. Appl. Math. **13** (2002) 403-429.
98. (with Y.Giga and S.Goto) *Dynamic boundary condition for Hamilton-Jacobi equations*. SIAM J Mathematical Analysis **34** (2003) 861-881.
99. (with V.M.Styles) *Computations of bidirectional grain boundary dynamics in thin metallic films*. Journal Computational Physics **187** (2003) 524-543 .
100. (with K.P. Deckelnick, G. Dziuk) *Error analysis of a semidiscrete numerical scheme for diffusion in axially symmetric surfaces* . SIAM J Numerical Analysis **41**(2003) 2161–2179.
101. (with D.Kay, V.M.Styles) *A finite element approximation of a variational formulation of Bean's model for superconductivity*. SIAM J Numerical Analysis **42** (2004) 1324–1341.
102. (with K.P. Deckelnick) *Uniqueness and error analysis for Hamilton-Jacobi equations with discontinuities* Interfaces and Free Boundaries **6** (2004) 329–349.

103. (with D. Kay and V. Styles) *Finite element analysis of a current density - electric field formulation of Bean's model for superconductivity* IMA J. Num. Anal. **25** (2005) 182–204.
104. (with K.P. Deckelnick and G. Dziuk) *Fully discrete semi-implicit second order splitting for anisotropic surface diffusion of graphs* SIAM J. Num. Anal. **43** (2005) 112–1138
105. (with K.P. Deckelnick, G. Dziuk) *Computation of Geometric PDEs and Mean Curvature Flow* Acta Numerica (2005) 139–232
106. (with B. Gawron, S. Maier-Paape and E.S. Van Vleck) *Discrete dynamics for convex and non-convex smoothing functionals in PDE based image restoration.* Communications Pure Appl. Anal. **5** (2006) 181–200
107. (with K.P. Deckelnick) *Propagation of graphs in two dimensional inhomogeneous media.* Applied Num. Maths. **5** (2006) 1163–1178
108. (with Y. Kashima) *A finite element analysis of critical state models for Type II superconductivity in 3D.* IMA Journal of Numerical Analysis Advance Access published on July 7, 2006. doi:10.1093/imanum/drl021
109. G. Dziuk and C.M. Elliott *Finite elements on evolving surfaces* IMAJ Num. Anal. Advance Access published on August 7, 2006. doi:10.1093/imanum/drl023
110. C.M. Elliott and S. A. McBeth *Analysis of the TV regularization and H^{-1} fidelity model for decomposing an image into cartoon plus texture* Comm. Pure Appl. Anal. (accepted)

Submitted

111. G. Dziuk and C.M. Elliott *Surface finite elements for parabolic equations* J. Computational Maths (submitted)
112. C.M. Elliott and S. Smitheson *Numerical analysis of the TV regularization and H^{-1} fidelity model for decomposing an image into cartoon plus texture* IMAJ Num. Anal. (submitted)
113. G. Dziuk and C.M. Elliott *Eulerian finite element method for parabolic equations on implicit surfaces* Interfaces Free Boundaries (submitted)