

CURRICULUM VITAE

Name: Stephen B.G. O'Brien.

Current position: Professor of applied mathematics, University of Limerick.

I am also Director of MACSI (Mathematics Applications Consortium for Science and Industry: www.macsi.ul.ie). MACSI was founded in 2006 as a result of a winning a competitive research grant from Science Foundation Ireland (mathematics initiative) of €4.34m.

University education

B.Sc. M.Sc. University College, Cork.

D. Phil. (Mathematics) Mathematical Institute, Oxford University.

Title of thesis: Free boundary problems from industry.

Supervisor: Dr. A.B. Tayler (Director: Oxford centre for industrial and applied mathematics).

Employment to date

1. February 1986: assumed position as member of scientific staff at Philips Research Laboratories, Eindhoven, The Netherlands in the group: Rheology and fluid dynamics.

2. September 1993, Lecturer in applied mathematics, UL.

May 1998, Senior lecturer, UL, September 2000, Associate Professor, November 2001, Professor of Applied Mathematics UL.

Postgraduate supervision

Claire Jordan M.Sc. (1997), Modelling of industrial problems.

Brian Fenton M.Sc. (1998), Modelling of Marangoni drying.

Michael Hayes Ph.D. (2001), Asymptotic and numerical models for coating flows.

Michael Chapwanya Ph.D. (2005), Modelling of bioremediation.

Sean Lacey Ph.D. (2007), Modelling of rimming flows.

Marguerite Robinson. Ph.D. (2007), Modelling of instabilities in bubbly flows.

Vincent Cregan (2011), Boundary value problems in the food industry.

Andrew Gordon (2009-2013), Hydrophobicity, hydrophilicity and two-phase flow in the gas diffusion layer of a polymer electrolyte fuel cell.

Kevin Moroney (with William Lee) (2013-)

Matthew Haynes (with Eugene Benilov) (2014-)

Simon Kaar (with William Lee) (2014-)

Kevin Devine (with Sarah Mitchell) (2014-)

Postdoctoral mentoring

Jenny Wright (2007-2010)

Jean Charpin (2007-2012)

Andrei Korobeinikov (2007-2012)

Michael Vynnycky (2007-2012)

Joanna Mason (2008-2010)

Jonathan Ward (2008-2011)
Brendan Florio (2013-)
Ricardo Barros (2014-)
Tuoi Vo (2013-)

Research funding

Visiting fellowship at Wolfson College and Mathematical Institute, University of Oxford, July 1994, Royal Irish Academy visiting fellowship grant, €5k.

Research Fellow at Philips Research Laboratories, Eindhoven, The Netherlands, August 1994.

Research visit to Mathematical Institute, Oxford, July 1995.

Forbairt/British Council travel grant (1996 programme). Project BC/96/030:Flow in thin liquid films, glaciers and ice sheets. €5k.

Forbairt Basic Research grant, Mathematical models for coating flows. 1996-1999, SC/96/625. Principal Investigator. €25k.

Philips Research Fellowship, 1997, (used to place Ph.D. student).

Philips Research Fellowship, 1998, (used to place Ph.D. student).

Forbairt International Collaboration grant (with Philips Research Labs), 1997, IC/97/091, U.L. Ph.D. student. €4k.

Research Fellow at Philips Research Laboratories, July 1998.

Enterprise Ireland Basic Research Grant. 2002-2004, SC/2001/188, Mathematical modelling of flow regime transitions in two phase flow. Principal Investigator. €56k.

Science Foundation Ireland. Investigator Programme 2003. High-frequency wave propagation and its applications to imaging science. (Collaborator i.e., not primary recipient). €408k.

IRC-SET/51190, Sean Lacey, Models for rimming flows. 2004-2007. €57k.

Science Foundation Ireland. Mathematics Initiative 2006. MACSI: Mathematics Applications Consortium for Science and Industry. Principal Investigator. €4.34 million.

IRC-SET/51710, 2006-2010, Vincent Cregan, Boundary value problems in the food industry, €80k.

Science Foundation Ireland. 2010. Conference and Workshop Programme. European Study Group with Industry: €10k.

IRC-SET Michael Devereux (with William Lee), 2008-2011, €80k.

Science Foundation Ireland. Mathematics Initiative one year extension 2011-2012. MACSI: Mathematics Applications Consortium for Science and Industry. Principal Investigator. €350k.

Science Foundation Ireland. Conference and Workshop Programme. European Study Group with Industry, 2012. €10k.

Science Foundation Ireland, Investigator Award, 2013, €2.2m

Research interests

Modelling of industrial problems, asymptotic methods, lubrication theory, free surface flows, Stokes flow, porous flow.

Journal publications, refereed conference proceedings, research notes

1. A moving boundary in porous flow, S.B.G. O'Brien , Philips TN 052/87.
2. An analytical solution to a free boundary problem, S.B.G. O'Brien , Philips TN 136/87.
3. Time dependent withdrawal and drainage of films, S.B.G. O'Brien , Philips TN 117/88.
4. The removal of colloidal particles from solid (silicon) substrates by fluid immersion: formulation of a mathematical model. S.B.G. O'Brien , Philips TN 173/88.
5. Fluid interfaces near small axisymmetric objects, S.B.G. O'Brien , Philips TN 070/89.
6. A moving boundary problem in porous flow, S.B.G. O'Brien & J.F. Dijksman, (1989), *Mathematical Engineering in Industry*, **vol.2 no.2**, 91.
<http://www.staff.ul.ie/obriens/papers/matheng89.pdf>
7. Particle removal by surface tension forces, (1989), S.B.G. O'Brien & A.F.M. Leenaars, *Philips Journal of Research* (invited paper in 75 anniversary edition), **44**, 183-209.
8. Solutions for removal of particles from substrates by surface tension forces. S.B.G. O'Brien , Philips NL report 6400, 1990.
9. The shape of a liquid-gas interface near a large cylinder, S.B.G. O'Brien , Philips TN 156/90.
10. On the shape of a small liquid drop, S.B.G. O'Brien , Philips TN 157/90.
11. Anisotropic conduction of heat in a flowing polymeric material, B.H.A.A. van den Brule & S.B.G. O'Brien, (1990), *Rheologica Acta*, **vol.29 no.6**, 580-590.
12. Anisotropic conduction in a polymeric material, B.H.A.A. van den Brule & S.B.G. O'Brien, (1990), *Proceedings of the British Society of Rheology*, Edinburgh.
13. A mathematical model for the cleansing of silicon substrates by fluid immersion, S.B.G. O'Brien & B.H.A.A. van den Brule, (1991), *Journal of Colloid and Interface Science*, **vol.144 no.1**, 210-221.
14. Shape of a small sessile drop and the determination of contact angle, S.B.G. O'Brien & B.H.A.A. van den Brule, (1991), *Journal of the Royal Society: Faraday Transactions*, **87**, 1579-1583.
<http://www.staff.ul.ie/obriens/papers/faraday91.pdf>
15. On the shape of small sessile and pendant drops by singular perturbation techniques, S.B.G. O'Brien, (1991), *Journal of Fluid Mechanics*, **233**, 519-537.
<http://www.staff.ul.ie/obriens/papers/jfm91.pdf>
16. Small drops, surface tension and contact angle, S.B.G. O'Brien, *Proceedings of the sixth European Conference for Mathematics in Industry (ECMI)*, Limerick 1991, 229-232.
17. Mathematical models for spin-coating, S.B.G. O'Brien , Philips TN 239/92.
18. Flow on an axisymmetric rotating substrate with localised defect, S.B.G. O'Brien , Philips TN 266-92.

19. Free boundary problems from industry, S.B.G. O'Brien, (1992), D.Phil thesis, University of Oxford.
20. Surface tension and contact angle problems in industry, S.B.G. O'Brien, (1992), *Journal of Adhesion Science and Technology*, **6 no.9**, 1037-1051.
21. Modelling of spinning with evaporation, S.B.G. O'Brien, Philips TN 193-93.
22. Modelling of flow on a tilted rotating substrate, S.B.G. O'Brien, Philips TN 194-93.
23. Thin film flow on the inside of a rotating horizontal cylinder, S.B.G. O'Brien, Philips TN 211-93.
24. On Marangoni drying: non-linear waves in a thin film, S.B.G. O'Brien, (1993), *J. Fluid Mech.*, **254**, 649-670.
25. Surface tension and contact angle problems in industry, S.B.G. O'Brien, (1993), in *Contact Angle, Wettability and Adhesion*, (Editor: K.L.Mittal, VSP Publishers 1993).
26. Local effects in some non-linear evolution equations, S.B.G. O'Brien, in *Integration of theory and applications in applied mechanics*, p.197, (Editors: J.F. Dijksman. & F.T.M. Nieuwstadt, Kluwer Academic Publishers 1993).
27. Asymptotic solutions for double pendant and extended sessile drops, S.B.G. O'Brien, (1994), *Quarterly of Applied Mathematics*, **Volume LII, Number 1**, 43-48.
28. Numerical and asymptotic solutions to a model for waterproofing telecommunications cables, S.B.G. O'Brien & P.J. Slikkerveer, (1994), *Int. J. Eng. Sci.*, **32 no.8**, 1283-1301.
29. Using applied mathematics in industrial problems, S.B.G. O'Brien, (1994), *Bulletin of the Irish mathematical society*, **33**, 22-34.
30. An implicit surface tension algorithm for surface tension dominated free and moving boundary problems, P.J. Slikkerveer, E.P. van Lohuizen & S.B.G. O'Brien, (1995), *Numerical Methods in Fluids*, **22 no.9**, 851-868.
31. Drying flow in a thin film induced by the presence of alcohol vapour, S.B.G. O'Brien, (1996), in *Progress in Industrial and Applied Mathematics*, Wiley-Teuber (Editor:Helmut Neunzert), 341-350.
32. A mechanism for episodic subduction on Venus, A.C. Fowler & S.B.G. O'Brien, (1996), *J. Geophys. Res (planets)*, **100 no.2**, 4755-4763.
33. The meniscus near a small sphere and its relationship to line pinning, S.B.G. O'Brien, (1996), *J. Coll. Int. Sci.*, **183**, 51.
34. Effects of evaporation during spin-coating, J.H. Lammers & S.B.G. O'Brien, (1996) in *The mechanics of thin film coatings*, World Scientific Press, (Editors: P.H.Gaskell, M.D Savage, J.L. Summers), 397-403.
35. Asymptotics of a pinhole, S.B.G. O'Brien, (1997), *J. Colloid Interface Sci.*, **191**, 514-516.
<http://www.staff.ul.ie/obriens/papers/jcis97.pdf>
36. Capillary effects in thin films, S.B.G. O'Brien, (1997), in *Progress in Industrial Mathematics*, Teubner, (Editors: Brons, Bendsoe, Sorensen), 408-416.
37. Spin-coating over topography, J.A. Lammers & S.B.G. O'Brien, (1997), in *Fluid Mechanics of coating processes*, (Ed. P. Bourgin), World Scientific, 278-290.

38. Industrial applied mathematical modelling at UL, S.B.G. O'Brien, (1997), The Irish Scientist Yearbook, 113.
39. The location of a shock in rimming flow, S.B.G. O'Brien & E.G. Gath, (1998), *Phys. Fluids*, **10**, 1040-1042.
<http://www.staff.ul.ie/obriens/papers/shock1998.pdf>
40. Asymptotics with small exponent in a model for ice-sheet surging, (1998) S.B.G. O'Brien, E.G. Gath, & A.C. Fowler, *Proc. Royal Irish Academy*, **98A**, no.1, 67-80.
41. A model for the coating of cylindrical light bulbs, S.B.G. O'Brien, (1998), *Progress in Industrial Mathematics 1998*, 46-55.
42. Matched asymptotic expansions for the shape of a hole in a thin film, S.B.G. O'Brien, (1999), *Quart. App. Math*, **57**, 453-465.
43. The fluid profile of a gravity driven film over any small two dimensional object ,M.A. Hayes, S.B.G. O'Brien & J.H. Lammers, (1999), in *Advances in coating and drying of thin films*, (Ed. F. Durst, H. Raszillier), Shaker Verlag, 253-258.
44. Small exponent asymptotics, A.C. Fowler, G. Kember, S.B.G. O'Brien, (2000), *IMA J. Appl. Math.* **64**, 23-38.
45. Models for flows over non-flat substrates, S.B.G O'Brien, M. Hayes, J. Lammers, (2000), in *Trends in the application of mathematics to mechanics*, 147-155, Elsevier (ISBN 2842992458).
46. Green's function for flow over a small two dimensional topography, M.Hayes, S.B.G. O'Brien, J. Lammers, (2000), *Phys. Fluids*, **12**, 2845-2861.
47. Exponential asymptotics with a small exponent, G. Kember, A.C. Fowler, S.B.G.O'Brien, (2000), *Quart. App. Math.*, **58**, 561-576.
48. Theory and modelling of thin liquid films, S.B.G. O'Brien, L. W. Schwartz, (2001), chapter in *Encyclopedia of Surface and Colloid Science*, Marcel Dekker, 5283-5297 and , S.B.G. O'Brien, L. W. Schwartz, (2001), *Encyclopedia of Surface and Colloid Science* on CD-ROM (long version).
49. An investigation of the hammocking effect using pneumatic tourniquet cuffs, V. Casey, Sabrina Griffin, S.B.G. O'Brien, (2001), *Medical Engineering and Physics*, Vol 23/7, 511-517.
50. Evaporative and topographical effects in coating flows, S.B.G. O'Brien, M. Hayes, (2001), *Mathematics in industry 2001*.
51. Pressure measurement under a bandage, V. Casey, M. O'Callaghan, S.B.G. O'Brien, (2001), *Sensors and their Application* (Institute of Physics,. Ed. K.T.V. Grattan, S.H. Khan, IOP Publishing), 88-94.
52. A model for dip-coating of a two liquid mixture, M. Hayes, S.B.G. O'Brien, (2002), *Int. J. Math. Math. Sci.*, **29**, 313-325.
53. S.B.G. O'Brien. 2002. Linear stability of rimming flow, *Quart. App. Math.* **60**, 201-212.
54. S.B.G. O'Brien. 2002. A mechanism for two dimensional instabilities in rimming flow. *Quart. App Math.* **60**, 283-300.
55. S.B.G. O'Brien, V. Casey, Numerical and asymptotic solutions for hammocking. (2002). *Quart. J. Mech. App. Math.* **55**, 409-420.
56. S.B.G. O'Brien, Asymptotics of a series of pendant drops. 2002. *SIAM J. App. Math.* **62** (5), 1569-1580.

57. A.F. Hegarty, S.B.G. O'Brien, S. Sikwila. 2003. Numerical solution of a rimming flow problem using a moving mesh method. *Computational methods in applied mathematics*. **3**, (3), 1-14.
58. S.B.G. O'Brien, V. Casey. 2003. A mathematical model for hammocking of a bandage on a limb. *Progress in Industrial Mathematics 2002*, 340-345.
59. A.C. Fowler & S.B.G. O'Brien. 2003. Lithospheric failure on Venus. *Proc. Royal Soc.* **459**, 2663-2704.
60. E.S. Benilov, S.B.G. O'Brien, I.A. Sazonov. 2003. A new type of instability: explosive disturbances in a thin layer inside a horizontally rotating cylinder. *J. Fluid Mech.* **497**, 201-224.
61. M.A. Hayes, S.B.G. O'Brien. 2004. Spin-coating over a small sinusoidal topography,. *Int. J. Math. Math. Sci.* **43**, 2279-2298.
62. O'Brien S.B.G. & Chapwanya M. 2004. Similarity solutions in groundwater flow. *J. Comp and App. Math.* **176/1**, 163-177.
63. S.B.G. O'Brien. 2004. Asymptotics of self intersecting solutions of the pendant drop equations, *Zeitschrift fur Angewandte Mathematik und Mechanik (ZAMM)*. **84**, 158-170.
64. S.B.G. O'Brien, M. A. Hayes. 2005. A model for gravity driven flow of a thin liquid solid suspension with evaporation effects. *Z. angew. Math. Phys (ZAMP)*. **56**, 1-22.
65. E.S. Benilov, S.B.G. O'Brien. 2005. Inertial instability of a liquid film inside a rotating horizontal cylinder. *Phys. Fluids A*. **17**, 1-17.
66. E.S. Benilov, N. V. Kopteva, S.B.G. O'Brien. 2005. Does surface tension stabilise the liquid film inside a rotating horizontal cylinder? *Q. Jl. Mech. Appl. Math.* **58(2)**, 185-200.
67. E.S. Benilov, S. Lacey, S.B.G. O'Brien. 2005. Exploding solutions in three dimensional rimming flow. *Q. Jl. Mech. Appl. Math.* **58(4)**, 563-576.
68. M. Chapwanya, S.B.G. O'Brien. 2005. Bioremediation in a porous medium with small bio-clogging. *Mathematical Modelling and Analysis*, 65-70. ISBN 9986-05-924-0.
69. E.S. Benilov, S. Lacey, S.B.G. O'Brien. 2005. Explosive solutions in rimming flow. *Mathematical Modelling and Analysis*, 447-453. ISBN 9986-05-924-0.
70. S.B.G. O'Brien. 2006. Explicit extended loop like solutions of the Laplace-Young equation capillary equations, *Proceedings of the Royal Irish Academy*. 106A, 63-84.
<http://www.staff.ul.ie/obriens/papers/pria2006.pdf>
71. S.B.G. O'Brien , L. W. Schwartz. 2006. Thin Film Flows: Theory and Modeling. *Encyclopedia of Surface and Colloid Science*, Second Edition; Taylor & Francis: New York, 2006; 8, 6304 - 6317.
72. S.B.G. O'Brien, V. Cregan. 2007. A note on spin coating with small evaporation. *J. Colloid Interface Science*, **314**, 324-328.
http://www.staff.ul.ie/obriens/papers/jcis_spin_2007.pdf
(<http://dx.doi.org/10.1016/j.jcis.2007.05.019>)
73. K. Cronin, D. Mackey, V. Cregan, S. O'Brien, J. P. Gleeson, K. Abodayeh. 2007. Selection of processing temperature to minimise product temperature variability, *Trans IChemE, Part C, Food and Bioproducts Processing*, 2007, 85(C4): 1-10.
74. M.R. Robinson , A.J. Alexander, A.C. Fowler, S.B.G. O'Brien. 2008. Waves in Guinness. *Physics of Fluids*. 20(6), (067101) 1-15.

<http://www.staff.ul.ie/obriens/papers/physfluids08.pdf>

75. S.B.G. O'Brien et al. (editors). 2008. Proceedings of the 62nd European Study group with Industry (ESGI 62).
76. S.B.G. O'Brien et al. (editors). 2009. Proceedings of the 70th European Study group with Industry (ESGI 70). (<http://www.macsul.ie/2/esgi70/>).
77. E.S. Benilov, M.S. Benilov, S.B.G. O'Brien. 2009. Existence and stability of regularised shock solutions with applications to rimming flows. *J. Eng. Math.* **63**(2), 197-212.
(<http://www.springerlink.com/openurl.asp?genre=article&id=doi:10.1007/s10665-008-9227-1>.)
78. M.R. Robinson, S.B.G. O'Brien. 2009. Smoothing of roll wave shocks by surface tension. *International journal of pure and applied mathematics.* **50**(2), 151-157.
79. S.B.G. O'Brien et al. (editors). 2010. Proceedings of the 75th European Study group with Industry (ESGI 75). (www.macsul.ie/esgi75)
80. M. Chapwanya, S.B.G. O'Brien, J.F. Williams. 2010. A perturbation solution for bacterial growth and bioremediation in a porous medium. *J. Comp. and App. Math.* **234**, 2709-2724.
http://www.staff.ul.ie/obriens/papers/jcam_biorem_2010.pdf
(<http://dx.doi.org/10.1016/j.cam.2010.01.024>)
81. V. Cregan, S. McKee, S.B.G. O'Brien. The sessile drop on a cone and plate rheometer. 2010. *SIAM J. App. Math.* , **70**(6) , 2075-2096.
http://www.staff.ul.ie/obriens/papers/siamdrops_2010.pdf
(<http://link.aip.org/link/?SMM/70/2075>).
82. K. Cronin, M. Çatak, D. Tellez-Medina, V. Cregan & SBG O' Brien. Modelling of particle motion in an internal re-circulatory fluidised bed. 2010. *Chemical Engineering Journal.* **164**, 393-402.
http://www.staff.ul.ie/obriens/papers/chemeng_particle_2010.pdf
(doi:10.1016/j.cej.2010.03.008).
83. J.F. Charpin, S.B.G. O'Brien. 2010. Improving the industry/mathematics interface. EIMI 2010, Educational interfaces between mathematics and industry, 145-155. http://www.staff.ul.ie/obriens/papers/SOBrien_EIMI10.pdf (www.cim.pt/files/proceedings_eimi_2010.pdf) + Springer book chapter+report at ICME congress, Seoul 2012.
84. S.B.G. O'Brien. 2011. Lin & Segel's standing gradient problem revisited: a lesson in mathematical modelling and asymptotics . *SIAM Review*, **53** (4), 775-796. http://www.staff.ul.ie/obriens/papers/siamreview_2011.pdf
(<http://link.aip.org/link/?SIR/53/775>)
85. A.C. Fowler, J.A. Ward, S.B.G. O'Brien. 2011. A simple model for multi-component etching. *J. Colloid Int. Sci.* **354**, 421-423.
http://www.staff.ul.ie/obriens/papers/jcis2011_glass.pdf
(<http://dx.doi.org/10.1016/j.jcis.2010.10.056>)

86. A.C. Fowler, J.A. Ward, S.B.G. O'Brien. 2011. Acid polishing of lead glass. *Journal of Mathematics in Industry* , 1:1.
http://www.staff.ul.ie/obriens/papers/JMI2011_glass.pdf
<http://www.mathematicsinindustry.com/content/1/1/1>
<http://dx.doi.org/10.1186/2190-5983-1-1>
87. J.P.F. Charpin, P. Hanrahan, J.F. Mason, S.B.G. O'Brien & M. O'Sullivan (2012): The MACSI summer school: a case study in outreach in mathematics, *International Journal of Mathematical Education in Science and Technology*, DOI:10.1080/0020739X.2012.662293
<http://www.staff.ul.ie/obriens/papers/IJMECT2011.pdf>
88. M. Catak, N. Bas, K. Cronin, S. O'Brien. 2011. A Mathematical model for solid particle motion in a recirculatory fluidised bed unit. *Canadian journal of chemical engineering*, **89**, 92-100.
<http://www.staff.ul.ie/obriens/papers/canchemeng2011.pdf>
<http://onlinelibrary.wiley.com/doi/10.1002/cjce.20390/full>
89. J.P.F. Charpin, J.F. Mason, S.B.G. O'Brien, M.O'Sullivan. 2011. Student mathematical modelling workshops as preparation for study groups with industry. *MSOR (Mathematics, Statistics and Operations Research Network) Connections*, Volume 11(3).
<http://www.staff.ul.ie/obriens/papers/MSORconnections.pdf>
 DOI:10.1080/0020739X.2012.662293
90. S.B.G. O'Brien et al. (editors). 2011. Proceedings of the 82nd European Study group with Industry (ESGI 82). (<http://www.macsi.ul.ie/esgi82>)
91. E.Benilov, S.B.G. O'Brien, V. Lapin. 2012. On rimming flows with shocks and pools. *J. Eng. Math.*, 75. 49-62.
<http://www.staff.ul.ie/obriens/papers/jem12rimming.pdf>
 (DOI 10.1007/s10665-011-9512-2).
92. V. Cregan, S. McKee and S.B.G. O'Brien. 2012. Asymptotics of a small liquid drop on a cone and plate. *Progress in industrial mathematics, Mathematics in Industry* 17, 449-455. http://www.staff.ul.ie/obriens/papers/drops_ecmi_2010.pdf
93. S. Mitchell, S.B.G. O'Brien. 2012. Asymptotics and numerical solutions for free boundary problems arising in diffusion of glassy polymers. *Applied Mathematics and Computation*. **219**, 376-388.
<http://www.staff.ul.ie/obriens/papers/jcam2012.pdf>
<http://dx.doi.org/10.1016/j.amc.2012.06.026>
94. V. Cregan, S.B.G. O'Brien, J. Charpin, K. Cronin. 2012. Temperature evolution in a partially submerged approximate cheese cylinder. *Journal of Food Engineering*. 115(3), 398-406.
<http://www.staff.ul.ie/obriens/papers/cheese.pdf>

<http://dx.doi.org/10.1016/j.jfoodeng.2012.10.022>

95. V. Cregan, S.B.G. O'Brien. 2013. Higher order asymptotic solutions for spin-coating with evaporation. *Applied Mathematics and Computation* . 223, 76-88. <http://www.staff.ul.ie/obriens/papers/spin2AMC13.pdf>
96. S. Mitchell, S.B.G.O'Brien. 2014. The two envelope problem: there is no conundrum. *Teaching Mathematics and its Applications (IMA)*. 33(4), 249-262. doi: 10.1093/teamat/hru019
97. S. Mitchell, S.B.G.O'Brien. 2014. Asymptotic and numerical solutions of a free boundary problem for the sorption of a finite amount of solvent into a glass polymer. *SIAM J. App Math*. 74, number 3, 697-723.
98. S.B.G. O'Brien et al. (editors). 2012. Proceedings of the 87nd European Study group with Industry (ESGI 87). http://www.macsi.ul.ie/esgi87/study_group87.php
99. M. Chapwanya, H.F. Winstanley, A.C. Fowler, S.B.G. O'Brien. 2014 . A channel clogging biofilm model. *Journal of mathematical biology*. DOI 10.1007/s00285-014-0833-4.
100. M. Chapwanya, S.B.G. O'Brien. 2013. A pore scale model of biofilm growth. Submitted to *Math Comp Simul*.
101. T. Vo, A. Hegarty, M. McGuinness, S.B.G. O'Brien, K.O'Sullivan, Detecting Heart-Rate while Jogging: Blind Source Separation of Gait and Heartbeat. 2014. *Mathematics in Industry Case Studies*, 7:2.
102. Asymptotics of a horizontal liquid bridge. 2016. M. Haynes, S.B.G. O'Brien, E.S. Benilov. (*Phys Fluids*, accepted, in press).
103. Modelling of coffee extraction during brewing using multiscale methods: an experimentally validated model. 2015. Moroney, K.M., Lee, W.T., O'Brien S.B.G., Suijver F., Marra, *Chem. Eng. Sci.*, **Volume 137**. 216-234.
104. Asymptotic analysis of the dominant mechanisms in the coffee extraction process. 2015. Moroney, K.M., Lee, W.T., O'Brien S.B.G., Suijver F., Marra, J. (in press, *SIAM J. App Math*.)
105. Mould-taper asymptotics and air gap formation in continuous casting. 2015. B.J. Florio, M. Vynnycky; S.L. Mitchell; S.B.G. O'Brien, *Appl. Math. Comput.*, 268, 1122-1139. doi:10.1016/j.amc.2015.07.011
106. Extraction kinetics during coffee brewing. 2016. Moroney, K.M., Lee, W.T., O'Brien S.B.G., Suijver F., Marra, J. *Math. Ind.*, 7:3.
107. On the interactive effects of mould taper and superheat on air gaps in continuous casting. 2016. B.J. Florio, M. Vynnycky; S.L. Mitchell; S.B.G. O'Brien. (in press, *Acta Mechanica*).
108. Stability of liquid curtains. 2016. E.S. Benilov, R. Barros, S.B.G. O'Brien. (in review, *Phys. Rev. E*)
109. Some typical mathematical problems regarding the application of a coating to a substrate. 2016. S. Mitchell, S.B.G. O'Brien. (Submitted *Siam Review*).

Selected conference presentations

Stroming in een dunne film, Nederlands warmte en stromingsleer contactgroep, Eindhoven 1988. (Flow in a thin film, Dutch fluid mechanics and heat flow contact group).

Modellen voor schoonmaken in de industrie, Nederlands warmte en stromingsleer contactgroep, Eindhoven 1989.

A numerical model for cleansing in the microprocessor industry, Second World Conference in Computational Mechanics, Stuttgart, 1990.

Heat flow in a flowing polymer, British Society of Rheology, Edinburgh 1990.

A mathematical model for cleansing using surface tension forces, British Applied Mathematics Colloquium, Oxford 1991.

Small drops, surface tension and contact angle, fifth ECMI conference, Limerick 1991.

Surface tension driven flow in a thin film and its relationship to Marangoni drying, A.I.Ch.E. International Symposium and Exposition on Coating Process Science and Technology, New Orleans March 1992.

Some surface tension and contact angle problems in Industry, invited paper in Symposium in honour of Prof. R. Good on contact angle, wettability and adhesion, San Francisco April 1992.

Local effects in thin film evolution equations, Second national mechanics congress, Rolduc, Netherlands, November 1992.

Sol-gel applications in the electronics industry, Proceedings sol-gel conference, Colmar, France, December 1992.

Some free boundary problems from industry, Burgersdag Symposium on Stromingsleer in de industrie (Fluid mechanics in industry), Burgerscentrum, Delft, January 1993.

A variational inequality formulation to a porous flow problem, Seventh ECMI conference, Montecatini, March 1993.

An industrial drying problem, Meeting of the Irish mechanics society, UCD 1993.

Spin-coating of oxidic layers on 27" CRT screens to form an antireflection coating, A.I.Ch.E. meeting April 1994, Atlanta.

Cleansing of silicon substrates by fluid immersion, DIAS Easter meeting, 1994, Dublin Institute for advanced studies.

An industrial cleaning problem, Irish Society for scientific and engineering computation, UCD 1994.

Drying flow in thin liquid films, ECMI 1994, Kaisers Lautern.

Asymptotic and numerical solutions to a model for the waterproofing of telecommunications cables, Invited lecture at DIAS Christmas meeting, December 1994.

Modelling of some industrial thin film flows, New Frontiers in industrial and Applied mathematics, Oxford University, January 1995.

Modelling pinholing and line-pinning, Annual meeting of the Irish Mathematical society, University of Limerick, 1995.

Flow in a porous medium, Meeting of the Irish Mechanics society, UCD 1995.

Analytic solutions for evaporation during spin-coating, (with J.H. Lammers and M.N.M. Beerens), 8th international symposium on coating process science and technology, A.I.Ch.E. Spring meeting, New Orleans 1996.

Capillary effects in thin films, ECMI 1996 conference, Lyngby, Denmark.

Aspects of Mathematical Modelling of spin-coating, Irish mechanics Society, UCD, 1996.

Hysteresis in line-pinning, DIAS Easter meeting, 1997.

Modelling Marangoni drying, (with B. Fenton), Irish Society for scientific and engineering computation, UCD, 1997.

Modelling of fluid/gas interfaces, (with C. Jordan), Irish Society for scientific and engineering computation, UCD 1997.

Examples of perturbation problems, Irish Mechanics Society Meeting, UCG June 1997.

The coating profile in front of a step resulting after spin-coating (with M.A. Hayes & J.H. Lammers), Second European Coating Symposium, Strasbourg, July 1997.

Jordan, C., & S.B.G. O'Brien, (1997), Modelling of fluid/gas interfaces, Irish Society for scientific and engineering computation, UCD 1997.

Spin-coating over topography (with J.H. Lammers & M. Decre), Second European Coating Symposium, Strasbourg, July 1997.

Flow in a rotating cylinder, Dublin Institute for Advanced Studies Symposium, December 1997.

Flow instabilities in thin films, ISSEC May 1997, UCD.

Mathematical modelling of rimming flow, ECMI 98, Goteburg, June 1998.

Industrial flow problems, invited speaker at annual meeting of the Irish Mathematical Society, Coleraine 1998.

Spin-coating over topography, (with J.H. Lammers, & M.M.J. Decre), 2nd International Conference on Coatings on Glass, September 06-10, 1998, Saarbrucken, Germany.

The coating profile on a finite substrate after dip-coating, (with M.A. Hayes & J.H. Lammers), Strategic research for industry, D.I.T. 1998.

Instabilities in thin film flow, Irish Mechanics Society Meeting, UCG 1998.

Fenton, B., & S.B.G. O'Brien, (1998), Modelling Marangoni drying, Irish Society for scientific and engineering computation, UCD.

A model for the coating of cylindrical light-bulbs, Dublin Institute for Advanced Study Symposium, December 1998.

The coating profile in front of a step (with M.A. Hayes), I.M.S. meeting, Dublin 1999.

The fluid profile of a gravity driven film over any small two dimensional object (with M.A. Hayes & J.H. Lammers), Third European Coating Conference, Erlangen, September 1999.

Thin film flow over features, SBG O'Brien, M Hayes, DIAS Easter Symposium, Dublin 2000.

The shape of a sequence of pendant drops, SBG O'Brien, ISSEC 2000, Dublin 2000.

Models for flows over topography, S.B.G. O'Brien, M Hayes, STAMM 2000, Galway 2000.

Coating of substrates with small imperfections, SBG O'Brien, M Hayes, IUTAM 2000, Birmingham 2000.

Models for spin-coating, M. Hayes, S.B.G. O'Brien, IMS 2000, Maynooth 2000.

Pore clogging in bioremediation, R. Fantoni, S.B.G. O'Brien, IMS 2000 (poster), Maynooth 2000.

Flow over non-flat substrates, S.B.G. O'Brien, M. Hayes, ECMI 2000, Pallermo, Sicily 2000.

Interface pressure measurement under an elastocrep bandage: a simple model for hammocking, V. Casey, M. Callaghan, S.B.G. O'Brien, Sensors & their applications XI, ISMCR 2001, London, 2001.

Spin-coating over a small sinusoidal topography, M. Hayes, S.B.G. O'Brien, ISSEC 2001, Dublin 2001.

A mathematical model for a wind-vane steering system, D. Tocher, S.B.G. O'Brien, ISSEC 2001, Dublin 2001.

Hammocking of a bandage on a limb caused by a sensor, S O'Brien, V. Casey, IMS Meeting, 2001.

Analytic solutions for flow over a small sinusoidal topography, M. Hayes, S. O'Brien, IMS 2001.

- A model for flow over a sinusoidal topography, M. Hayes, S. O'Brien, Fourth Dublin Differential Equations Conference, DCU, September 2001.
- Non-Invasive Sensing of Biomedical Interface Pressures: Hammocking Effect Models, V. Casey, S. Griffin, M. Callaghan, S.B.G. O'Brien, pp 56, Proceedings of Bioengineering in Ireland (8), and, The 16th Meeting of the Northern Ireland Biomedical Engineering Society, joint conference, Eds. D.P. Fitzpatrick, B. A. O. McCormack and G. R. Dickson, 26th and 27th Jan 2002, Sligo, published by Dept. Mechanical Engineering, UCD, ISBN: 1-902277-57-0.
- Bioremediation in a porous medium, M. Chapwanya, S.B.G. O'Brien, ISSEC, Dublin 2002.
- Chapwanya M. & O'Brien S.B.G. Flow problems in bioremediation In: Abstracts of the Irish Society for Scientific and Engineering Computation, Annual Symposium, May 24-25 pp 20, National University of Ireland, Galway, 2002.
- Asymptotics of hammocking. S.B.G. O'Brien, V. Casey. ECMI 2002. Riga, September 2002.
- Chapwanya M. & O'Brien S.B.G. Corner singularities in porous flow In: Abstracts of the Irish Society for Scientific and Engineering Computation, Annual Symposium, May 23-24 pp 21, University College Dublin, Dublin, 2003.
- Chapwanya M. & O'Brien S.B.G. Heat and moisture migration in a porous media In: Abstracts of the British Applied Mathematic Colloquium, April 19-22, University of East Anglia, UK, 2004.
- Chapwanya M. & O'Brien S.B.G. Contaminant movement in a freezing porous medium In: Abstracts of the Irish Society for Scientific and Engineering Computation, Annual Symposium, May 21-22 pp 36, University of Limerick, Limerick, 2004.
- S. Lacey, SBG O'Brien, Irish Society for Scientific and Engineering Computation (ISSEC) Annual Symposium, 21st-22nd May 2004, University of Limerick. Models of Rimming Flow.
- On roll waves. M. Robinson, S.B.G. O'Brien, ISSEC 2004.
- Chapwanya M. & O'Brien S.B.G. Modelling bioremediation in a porous medium with bio clogging In: Abstracts of the 10th International Conference Mathematical Modelling and Analysis & 2nd International Conference Computational Methods in Applied Mathematics, June 1-5, Trakai, Lithuania, 2005.
- Chapwanya M. & O'Brien S.B.G. Clogging in a porous medium In: Abstracts of the Irish Society for Scientific and Engineering Computation, Annual Symposium, May 20-21 pp 23, University College Cork, Cork, 2005.
- Chapwanya M. & O'Brien S.B.G. Modelling biofilm growth in a porous medium with applications in bioremediation In: Abstracts of the Irish Mechanics Society: Symposium on Recent Advances in Mechanics and Materials, April 11, University College Dublin, Ireland, 2005.
- S. Lacey, SBG O'Brien, Irish Mechanics Society Symposium on Recent Advances in Mechanics and Materials, 11th April 2005, University College Dublin. Stability of Rimming Flows.
- S. Lacey, E Benilov, SBG O'Brien, 10th International Conference on Mathematical Modelling (MMA) and Analysis and 2nd International Conference on Computational Methods in Applied Mathematics (CMAM), 1st-5th June 2005, Trakai, Lithuania. Exploding Solutions for Rimming Flows.
- S. Lacey, E Benilov, SBG O'Brien, International Conference on Numerical Analysis and Applied Mathematics (ICNAAM), 16th-20th September 2005, Rhodes, Greece. Explosive Instabilities for a Three Dimensional Liquid Film inside a Horizontal Rotating Cylinder.
- A. Rurua, E. McQuade, S.B.G. O'Brien. Neutral stability of MIT Rule based adaptive controllers. WSEAS Conference, Prague 2006.

- M. Robinson, A.C. Fowler, S.B.G. O'Brien, 2006, Onset of instability in two phase bubbly flows, Proceedings of a joint conference of ACME and ISSEC.
- Cronin, K & O'Brien, S., Modelling of particle motion in a recirculatory fluidized bed, Proceedings of IMC, Dublin 2008.
- L.W. Schwartz, J. Charpin, S.B.G. O'Brien, "Sliding Drops of Generalized Newtonian Liquid", AICHE, Philadelphia, 2008.
- W. Lee, S.B.G. O'Brien, Blowing fuses and etching lead crystal glass, BAMC, Manchester, 2008.
- V. Cregan, S.B.G. O'Brien, M. Robinson, Industrial problems with a small parameter, Fifth International Conference of Applied Mathematics and Computing, Plovdiv, Bulgaria, 2008.
- V. Cregan, S.B.G. O'Brien, M. Robinson, M. Chapwanya, Asymptotics of some industrial problems, Ericeira (Portugal), 2008.
- V. Cregan, S.B.G. O'Brien, Asymptotics of spin-coating with evaporation, ECMI 2008, London.
- V. Cregan, J. Charpin, K. Cronin, S.B.G. O'Brien, Simulating the cooling of a cheese cylinder floating in brine, SIAM 2009, Denver.
- Modelling of particle motion in an internal re-circulatory fluidised bed. Kevin Cronin, Muammer Çatak, Dario Tellez-Medina, Vincent Cregan & Stephen O'Brien. Presented at the International Symposium on Agglomeration 2009 at University of Sheffield, England (Refereed Proceedings).
- Comparison of fluidized spray granulation and fluidized hot melt granulation on the resulting granule properties. Tellez-Medina D. I., O'Leary K., Byrne E., Fitzpatrick, J., Stephen O'Brien & Cronin K. World Congress on Particle Technology 6, Nuremberg, Germany, 24-26 April, 2010.
- V. Cregan, S. McKee, S.B.G. O'Brien. Asymptotics of a sessile drop. ISSEC Meeting 2010, UCD, Dublin.
- V. Cregan, S. McKee, S.B.G. O'Brien. The sessile drop on a cone and plate rheometer. ECMI 2010, Wuppertal.
- W. Lee, S.B.G. O'Brien. Blowing polysilicon fuses and acid polishing of lead crystal glass. ECMI 2012, Lund, Sweden.
- S. Mitchell, S.B.G. O'Brien. Approximate solution techniques for a free boundary problem arising in the diffusion of glassy polymers. ECMI 2012, Lund, Sweden.
- K. Moroney, S O'Brien, W. Lee, "Mathematical Modelling of the Coffee Brewing Process" at the BAMC 2014 in Cardiff 28-30th April.
- M.Haynes, E.S. Benilov, S.B.G. O'Brien. 2014. Asymptotic Solution of the Young Laplace Equation for a Horizontal Fluid Bridge. British Applied Mathematics Colloquium, Cardiff.
- K. Moroney, S O'Brien, W. Lee, "The Coffee Brewing Process" at the UL-NUIG Research Day in UL on 20th May 2014.
- E. McQuade, A. Rurua, S.B.G. O'Brien. Model Reference Adaptive Control (MRAC) Stability. 25th Irish system and signals conference, June 2014.
- W. Lee, J. Mason, S.B.G. O'Brien. Study groups in Ireland: a reflection. ECMI 2014, Taormina.
- W. Lee, J. Mason, S.B.G. O'Brien. Setting up an industrial mathematics network in Ireland. ECMI 2014, Taormina.

K. Moroney, W. Lee, S.B.G. O'Brien, F. Suijver, J. Marra, Mathematical modelling of the coffee brewing process, ECMI 2014, Taormina.

M. Vynnycky, S. Mitchell, B. Florio, S.B.G. O'Brien. Decoupling the interaction of solid and fluid mechanics in the modelling of continuous casting. ECMI 2014, Taormina.

K. Moroney, W. Lee, S.B.G. O'Brien, F. Suijver, J. Marra. Modelling extraction and transport of coffee during brewing. SIAM student chapter, Nui Galway December 2014.

J. Duley, A.C.Fowler, I. Moyles, S.B.G. O'Brien. A model for heterogeneous nucleation and short term growth of molecular clusters. ECMI 2016.

M. Haynes, S.B.G. O'Brien, E.S. Benilov. Equivalence of stability methods for a horizontal liquid bridge. ECMI 2016.

S. Kaar, W.Lee, S.B.G O'Brien. Separation of bubbles in Guinness leading to instability waves. ECMI 2016.

K. Moroney, W. Lee, S.B.G. O'Brien, F. Suijver, J. Marra Asymptotic analysis of a coffee extraction model from a fixed coffee bed. ECMI 2016.

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SIAM (Society for Industrial and Applied Mathematics) journal on applied mathematics.

Quarterly of applied mathematics.

Journal of fluid mechanics.

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Journal of colloid and interface science.

Membership of professional associations

International association for computational mechanics, 1990-.

Irish mathematical society, 1993-.

Irish mechanics society, 1993-.

Research associate D.I.A.S., 1994-.

Royal Irish Academy mechanics committee, 1998-2000.

Member of Council, ECMI (European Consortium for Mathematics in industry).
2000-2009.

Royal Irish Academy Mathematics Committee. 2005-2010.

IRCSET council 2011-2012.

Vice President, ECMI, 2012-2014.

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