

Publications & Reports to Government Depts:

(Categorized by subject, approximate chronological order only)

Nuclear Engineering (BHRA Fluid Engineering)

1. Fordham, E.J. (1978). On the mechanisms of flow-induced vibrations in bundles of circular cylinders in cross-flow. *British Hydrodynamics Research Association* (now BHRA Fluid Engineering) Technical Note TN1467, April 1978.
2. Fordham, E.J. (1978). Some suggestions for estimating the thermal hydraulic consequences of moderate rates of fission gas release in fast reactors, with particular emphasis on the pin surface temperature. *Report to HM Nuclear Installations Inspectorate*, October 1978.
3. Fordham, E.J. (1978). An isothermal, quasi-steady model for estimating fission gas leakout rates and decay times from failed fast reactor fuel pins. *Report to HM Nuclear Installations Inspectorate*, November 1978.
4. Fordham, E.J. (1978). A mathematical model to study coolant voiding due to very rapid fission gas release from failed fuel pins in a fast reactor subassembly. *Report to HM Nuclear Installations Inspectorate*, December 1978.

Note: reports 2 – 4 were initially classified “Commercial-In-Confidence” but formally de-classified in 1982, at my request. Report item 1 was always a publication of BHRA.

Wind Energy (Cavendish Laboratory, with Prof Sir Martin Ryle FRS FEng et al.)

5. Fordham, E.J. & M.B. Anderson (1982). An analysis of results from an atmospheric experiment to examine the structure of the turbulent wind as seen by a rotating observer. *Proc. 4th British Wind Energy Association (B.W.E.A.) Wind Energy Conf.*, Cranfield, Bedford, March 1982.
6. Fordham, E.J. (1983). The distortion of large scale turbulence by a wire gauze disc. *Proc. 5th B.W.E.A. Wind Energy Conf.*, Reading, March 1983.
7. Powles, S.J.R., E.J. Fordham & M.B. Anderson (1983). A numerical simulation of the response of a large horizontal axis wind turbine to real wind data. *Proc. 5th B.W.E.A. Conf.*, Reading, March 1983.
8. Wilson, D.M.A., E.J. Fordham & S.J.R. Powles (1984). A 5 metre diameter horizontal axis research wind turbine using a commercially available alternator and gearbox. *Proc. 6th B.W.E.A. Wind Energy Conf.*, Reading, March 1984.
9. Fordham, E.J. (1985). The spatial structure of turbulence in the atmospheric boundary layer. *Wind Engineering*, **9**, 2, 95–133.

Filtration of Oil-well drilling muds (Schlumberger Cambridge Research Ltd)

10. Fordham, E.J., G.C. Maitland, G.H. Meeten & J.D. Sherwood (1988). Drilling fluid physics. *The Drilling and Pumping Journal*, No. 6, August 1988, 12–26. (pub. Schlumberger Cambridge Research Ltd.)
11. Fordham, E.J., H.K.J. Ladva, C. Hall, J.-F. Baret & J.D. Sherwood (1988). Dynamic filtration of bentonite muds under different flow conditions. *Proc. Ann. Tech. Conf. of the SPE*, Houston, Texas, October 1988. **SPE-18038**.
12. Fordham, E.J. & H.K.J. Ladva (1989). Cross-flow filtration of bentonite suspensions. *PhysicoChemical Hydrodynamics*, **11**, 4, 411–439.
13. Fordham, E.J., S.H. Bittleston & M.A. Tehrani (1991). Viscoplastic flow in centred annuli, slots and pipes. *Ind. Eng. Chem. Research*, **29**, 517–524.
14. Fordham, E.J., C. Hall, P.S. Hammond & D. Murch (1991) Full-scale experiments on drilling mud filtration. In: *Advances in Filtration and Separation Technology*, **3**, 234–237, Gulf Pub. Co., Houston. Proc. Am. Filt. Soc. Fall Meeting, 1990, Baton Rouge, LA. **Best Paper** award of the conference.
15. Fordham, E.J. & H.K.J. Ladva (1991). Cross-flow filtration of bentonite suspensions II. *J. Coll. Int. Sci.*, **148**, 1, 29–34.
16. Fordham, E.J., P.S. Hammond, H.K.J. Ladva, L. Schwartz & D. Wilkinson (1992). The early stages of drilling mud filtration on permeable rock. *Proc. 6th IFP (Institut Français du Pétrole) Exploration and Production Research Conf.*, St. Raphaël, September 1991: *Physical Chemistry of Colloids and Interfaces in Oil Production*, 339–345. Eds: H. Toulhoat and J. Lecourtier. Editions Technip, Paris.
17. Bittleston, S.H., E.J. Fordham & M.A. Tehrani (1994). Letter to the Editor: "Flow of yield-pseudoplastic fluids in concentric annuli". *A.I.Ch.E. Journal*, **40**, 2, 378–379.

Pioneering work on MRI of sedimentary rocks (Herchel Smith Laboratory, with Prof L D Hall FRS(Can))

18. Horsfield, M.A., E.J. Fordham, C. Hall & L.D. Hall (1989). ^1H N.M.R. imaging studies of filtration in colloidal suspensions. *J. Magn. Reson.*, **81**, 593–6.
19. Fordham, E.J., M.A. Horsfield, C. Hall & L.D. Hall (1991). Low contrast secondary imbibition in long rock cores. *Proc. 1st Int. Meeting on Recent Advances in N.M.R. Applications to Porous Media*, Bologna, Italy, 14–16 November 1990. *Magn. Reson. Imaging*, **9**, 4, 803–808.
20. Fordham, E.J., T.P.L. Roberts, T.A. Carpenter, C. Hall & L.D. Hall (1991). Dynamic N.M.R. imaging rapid depth filtration of clay in porous media. *A.I.Ch.E. Journal*, **37**, 12, 1900–1903.
21. Fordham, E.J., T.P.L. Roberts, T.A. Carpenter, L.D. Hall, G.C. Maitland & C. Hall (1991). N.M.R. imaging of simulated voids in cement slurries. *A.I.Ch.E. Journal*, **37**, 12, 1895–1899.
22. Fordham, E.J., M.A. Horsfield, L.D. Hall & G.C. Maitland (1993). Depth filtration of clay in rock cores observed by one-dimensional ^1H N.M.R. imaging. *J. Coll. Int. Sci.*, **156**, 1, 253–255.
23. Fordham, E.J., T.S. Ramakrishnan, M.R. Sharpe, L.D. Hall & C. Hall (1993). Saturation gradients in drainage of porous media: N.M.R. imaging measurements. *A.I.Ch.E. Journal*, **39**, 9, 1431–1443.
24. Fordham, E.J., S.J. Gibbs & L.D. Hall (1993). Partially restricted diffusion in a permeable sandstone: Observations by stimulated echo PFG NMR. *Proc. 2nd Int. Meeting on Recent Advances in M.R. Applications to Porous Media*, Canterbury, Kent, U.K., 14–16 April 1993. *Magn. Reson. Imaging*, **12**, 2, 279–284.
25. Fordham, E.J., C. Hall, T.P.L. Roberts, L.D. Hall & G.C. Maitland (1994). Imaging voids in cement slurries. International workshop (invited paper), Guerville, France. 24–25 March 1992: *Applications of N.M.R. spectroscopy to cement science*. Eds: P. Colombet & A.-R. Grimmer. Pub. Gordon and Breach.
26. Fischer, A.E., B.J. Balcom, E.J. Fordham, T.A. Carpenter & L.D. Hall (1995). Measurement of two-dimensional tracer diffusion and dispersion in heterogeneous media using NMR imaging. *J. Phys. D (Appl. Phys.)*, **28**, 384–397.
27. Fordham, E.J., A. Sezginer & L.D. Hall (1995). Imaging multi-exponential relaxation in the $(y, \log T_1)$ plane: Application to clay filtration in rock cores. *J. Magn. Reson. Ser. A*, **113**, 139–150.
28. Fordham, E.J., P.P. Mitra & L.L. Latour (1996). Effective diffusion times in multiple-pulse PFG diffusion measurements in porous media. *J. Magn. Reson. Ser. A*, **121**, 187–192.

Bayesian methods in Flow Imaging (Herchel Smith Laboratory)

29. Xing, D., S.J. Gibbs, J.A. Derbyshire, E.J. Fordham, T.A. Carpenter & L.D. Hall (1995). Bayesian analysis for quantitative NMR flow and diffusion imaging. *J. Magn. Reson. Ser. B*, **106**, 1, 1–9.
30. Fordham, E.J., D. Xing, S.J. Gibbs, J.A. Derbyshire & L.D. Hall (1996). Flow and diffusion images from Bayesian spectral analysis of motion-encoded NMR data. *Proc. 14th Int. Workshop (St. John's College, Cambridge, U.K.) on: Maximum Entropy & Bayesian Methods*, Eds. Skilling, J., S. Sibisi, Kluwer, 1–12.

Optical Fibre Sensors for Multi-Phase Flows (Schlumberger Cambridge Research Ltd)

31. Butter, R.S., D.R. Waterman, A.H. Lettington, R.T. Ramos & E.J. Fordham (1997). Production and wetting properties of fluorinated Diamond-Like Carbon films. *Thin Solid Films*, **311**, 107–113.
32. Ramos, R.T. & E.J. Fordham (1999). Oblique-tip fibre-optic sensors for multi-phase fluid discrimination. *J. Lightwave Technol.*, **17**, 8, 1392–1400.
33. Ramos, R.T. & E.J. Fordham (1999). Fluid discrimination in multi-phase flow. *Proc. 13th Int. Conf. on Optical Fiber Sensors ("OFS-13")*, Kyongju, Korea, 12–16 April 1999, SPIE V.3746, 553–556.
34. Fordham, E.J., A. Holmes, R.T. Ramos, S. Simonian, S.-M. Huang & C.P. Lenn (1999). Multi-phase-fluid discrimination with local fibre-optical probes. I. Liquid/liquid flows. *Meas. Sci. & Technol.*, **10**, 1329–1337.
35. Fordham, E.J., S. Simonian, R.T. Ramos, A. Holmes, S.-M. Huang & C.P. Lenn (1999). Multi-phase-fluid discrimination with local fibre-optical probes. II. Gas/liquid flows. *Meas. Sci. & Technol.*, **10**, 1338–1346.
36. Fordham, E.J., R.T. Ramos, A. Holmes, S. Simonian, S.-M. Huang & C.P. Lenn (1999). Multi-phase-fluid discrimination with local fibre-optical probes. III. Three-phase flows. *Meas. Sci. & Technol.*, **10**, 1347–1352.
37. Fordham, E.J., C.P. Lenn, A. Holmes, S. Simonian & R.T. Ramos (1999). Corrections of gradiomanometer data for volume fractions in two-phase flows. *Meas. Sci. & Technol.*, **10**, N131–N135.

Interpretation Petrophysics (Schlumberger-Doll Research, Ridgefield, CT)

38. Allen, D.F., F. Auzeais, E. Dussan, P. Goode, T.S. Ramakrishnan, L. Schwartz, D. Wilkinson, E.J. Fordham, P. Hammond & R. Williams (1991). Invasion revisited. *Oilfield Review*, **3**, 3, 10–23. (Elsevier, Amsterdam).
39. Fordham, E.J., D.F. Allen, H.K.J. Ladva & N.J. Alderman (1991). The principle of a critical invasion rate and its implications for log interpretation. *Proc. Ann. Tech. Conf. of the SPE*, Dallas, TX, October 1991. **SPE-22539**.
40. Ramakrishnan, T.S., L.M. Schwartz, E.J. Fordham, W.E. Kenyon & D.J. Wilkinson (1998). Forward models for nuclear magnetic resonance in carbonate rocks. *Trans. SPWLA 39th Ann. Logging Symp.*, Keystone, CO, 26–29 May 1998, Paper SS. **Best Paper** award of the conference.
41. Ramakrishnan, T.S., A. Rabaute, E.J. Fordham, R. Ramamoorthy, M. Herron, A. Matteson, B. Rhaguraman, A. Mahdi, M. Akbar & F. Kuchuk (1998). A petrophysical and petrographic study of carbonate cores from the Thamama formation. *Proc. 8th Abu Dhabi Int. Petrol. Exhibition & Conf.*, Abu Dhabi, U.A.E., 11–14 October 1998. **SPE- 49502**.
42. Ramakrishnan, T.S., E.J. Fordham, L. Venkataramanan, M. Flaum and L.M. Schwartz (1999). New interpretation methodology based on forward models for magnetic resonance in carbonates. *Trans. SPWLA 40th Ann. Logging Symp.*, Oslo, Norway, 30 May–3 June 1999.
43. Ramakrishnan, T.S., L.M. Schwartz, E.J. Fordham, W.E. Kenyon & D.J. Wilkinson (1999). Forward models for nuclear magnetic resonance in carbonate rocks. *The Log Analyst*, **40**, 4, 260–270 (July-August 1999).
44. Ramakrishnan, T.S., R. Ramamoorthy, E.J. Fordham, L.M. Schwartz, M. Herron, N. Saito & A. Rabaute (2001). A model-based interpretation methodology for evaluating carbonate reservoirs. *Proc. 2001 SPE Ann. Tech. Conf. & Exhibition*, New Orleans, LA, 30 September–3 October 2001. **SPE-71704**.
45. Allen, D.F., A. Boyd, E.J. Fordham, M.O. Amabeoku, W. Kenyon & W.B. Ward (2001). The practical application on NMR logging in Carbonates: 3 Case Studies. *Trans. SPWLA 42nd Ann. Logging Symp.*, Houston, TX; 17–20 June 2001.
46. Hürlimann, M.D., A. Matteson, J.E. Massey, D.F. Allen, E.J. Fordham, F. Antonsen & H.G. Rueslåtten (2003–4). Application of diffusion editing as Chlorite indicator. *Proc. Int. Symp. SCA*, Pau, France, Sept. 21–24 2003. **SCA2003-26**. Also *Petrophysics*, **45**(5), 414–421, Sept.–Oct. 2004.
47. S. Frank, R. Narayanan, P.M. Hansen, D. Allen, T. Albrechtsen, H. Steinhardt, M. Raven, E. Fordham, E. Bize & D. Rose (2005). Carbonate rock typing using NMR data: a case study from Al Shaheen field, offshore Qatar. *Proc. International Petroleum Technology Conference*, Doha, Qatar, 21-23 November 2005. IPTC preprint **IPTC-10889**.
48. B.K. Pedersen, E.S. Pedersen, S. Morriss, M.V. Constable, B. Vissapragada, A. Sibbitt, C. Stoller, J. Almaguer, M. Evans, F. Shray, J. Grau, E. Fordham, C.C. Minh, H. Scott & D. McKeon (2006). Understanding the effects of Cesium/Potassium Formate fluid on well log response: a case study of the Kristin and Kvitebjorn fields, offshore Norway. *Proc. 2006 Annual Technical Conference of the Soc. Petroleum Engineers*, San Antonio, TX, 24-27 September 2006. **SPE-103067**.

Low-field laboratory NMR of porous media (Schlumberger-Doll Research, Ridgefield, CT)

49. G. Leu, E.J. Fordham, M.D. Hürlimann & P. Frulla (2004). Fixed and Pulsed gradient methods in low field core analysis. *Proc. 7th Int. Meeting on Recent Advances in M.R. applications to Porous Media* ("MRPM7"), Palaiseau, France 5-8 July, 2004. Also *Magn. Reson. Imaging.*, **23**, 305-309 (2005).
50. P.M. Singer, G. Leu, E.J. Fordham & P.N. Sen (2006). Low magnetic fields for flow propagators in permeable rocks. *Journal of Magnetic Resonance*, doi:10.1016/j.jmr.2006.08.006

Joint work with MRRC, Dept of Chemical Engineering (with Prof L F Gladden FRS FREng)

51. J. Mitchell, A.J. Sederman, E.J. Fordham, M.L. Johns & L.F. Gladden (2008). A rapid measurement of flow propagators in porous rocks. *J. Magn. Reson.* **191**, 267-272 (2008).
52. J. Mitchell, D.A. Graf von der Schulenburg, D.J. Holland, E.J. Fordham, M.L. Johns & L.F. Gladden (2008). Determining NMR flow propagator moments in porous rocks without the influence of relaxation. *J. Magn. Reson.* **193**, 218-225 (2008).
53. T.C. Chandrasekera, J. Mitchell, E.J. Fordham, L.F. Gladden & M.L. Johns (2008). Rapid encoding of T_1 with spectral resolution in n -dimensional relaxation correlations. *J. Magn. Reson.* **194**, 156-161 (2008).

54. Mitchell J., E.J. Fordham, D.A. Graf von der Schulenburg, D.J. Holland, A.J. Sederman, M.L. Johns & L.F. Gladden (2008). Improving accuracy and speed of NMR flow propagator measurements in permeable rocks. *AIP conference proceedings* **1081**, 71-74.
55. J. Mitchell, M.D. Hurlimann & E.J. Fordham (2009). A rapid measure of the ratio T_1 / T_2 : the DE-CPMG pulse sequence *J. Magn. Reson.* **200**, 198-206 (2009).
56. L.F. Gladden, T.C. Chandrasekera, E.J. Fordham, M.L. Johns, M.D. Mantle, J. Mitchell, M.H. Sankey, A.J. Sederman & D. Weber (2009). Probing multi-component transport in porous media over a hierarchy of length-scales. *AIP Conference Proceedings* **1081**, 7-10 (2009).
57. J. Mitchell, E.J. Fordham, D.A. Graf von der Schulenburg, D.J. Holland, A.J. Sederman, M.L. Johns & L.F. Gladden (2009). Improving accuracy and speed of NMR flow propagator measurements in permeable rocks. *AIP Conference Proceedings 2009* **1081**, 71-74 (2009).
58. J. Mitchell, T.C. Chandrasekera, E.J. Fordham, J. Crawshaw, J. Staniland, M.L. Johns & L.F. Gladden (2009). Chemical resolution in $T_1 - T_2$ correlations. *Diffusion Fundamentals*(2009) **10**, 24.1-24.3.
59. J. Mitchell, T.C. Chandrasekera, E.J. Fordham, M.L. Johns & L.F. Gladden (2010). Nuclear magnetic resonance relaxation and diffusion in the presence of internal gradients: The effect of magnetic field strength. *Phys. Rev. E*, **81**, 026101.
60. Mitchell J. & Fordham E.J. (2011) Emulation of petroleum well-logging $D - T_2$ correlations on a standard benchtop spectrometer *J. Magn. Reson.* **661**, 144-149.
61. Mitchell J., Chandrasekera T.C., Roberts S.T., Holland D.J., Blake A., Fordham E.J. & Gladden L.F. (2011). Relaxation analysis of porous media at high magnetic field strengths: the influence of internal gradients. *AIP conference proceedings (2011)*, **1330**, 35-38.
62. Schwartz L.M., Johnson D.J., Mitchell J., Chandrasekera T.C. & Fordham E.J. (2013). Modelling two dimensional magnetic resonance measurements in coupled pore systems. *Phys. Rev. E*, **88**, 032813.

Enhanced Oil Recovery

(Schlumberger Cambridge Research Ltd)

63. Mitchell J., Fordham E.J. & Staniland J. (2010) Appendix - Laboratory NMR oil recovery in: Arora S. *et al.* Single-well in-situ measurement of residual oil saturation after an EOR chemical flood. **SPE-129069**.
64. Mitchell J., Staniland J., Chassagne R. & Fordham E.J. (2012). Quantitative in-situ enhanced oil recovery monitoring using magnetic resonance. *Trans. Porous Med.* **94**, 683-706.
65. Mitchell J., Edwards J., Fordham E.J., Staniland J., Chassagne R., Cherukupalli P., Wilson O., Faber R. & Bouwmeester R. (2012). Quantitative remaining oil interpretation using magnetic resonance; From the laboratory to the pilot. **SPE-154704**, 2012.
66. Edwards, J., Mutina, A., Cheng, Y., Gao, J., Fordham, E.J., Freed, D., Bachman, N., Dolan, S., Al Rashdi, Y., Wilson, O.B., Haynes, B. & Looyestijn, W. (2012). Time-lapse diffusion logs to discriminate reservoir oil from miscible gas. **SPE-154616**, 2012.
67. Mitchell J., Staniland J., Wilson A., Howe A., Clarke A., Fordham E.J., Edwards J., Faber R. & Bouwmeester R. (2012). Magnetic resonance imaging of chemical EOR in core to complement field pilot studies. **SCA2012-A30**.
68. Edwards, J., Hammami, A., Bachman, N., Fordham, E., Flaum, M., Bakker, G., Bettembourg, S., Putra, P., & Rawnsley, K. (2012). Technologies for monitoring matrix oil saturation for TA-GOGD. **SPE-SAS-188**.
69. Mitchell J., Staniland J., Chassagne, R. Mogensen, K., Frank S. & Fordham E.J. (2013). Mapping oil saturation distribution in a limestone plug with low-field magnetic resonance. *J. Petrol. Sci. Eng.*, **108**, 14-21.
70. Mitchell J., Staniland J. & Fordham E.J. (2013). Paramagnetic doping agents in magnetic resonance studies of oil recovery. *Petrophysics*, **54**, 349-367.

Review Articles on MRI in Petrophysics and Low-field NMR Technology (Schlumberger Gould Research)

71. Mitchell J., Chandrasekera T.C., Holland D.J., Gladden L.F. & Fordham E.J. (2013). Magnetic resonance imaging in laboratory petrophysical core analysis. *Phys. Rep.*, **526**, 165-225.
72. Mitchell J., Gladden L.F., Chandrasekera T.C. & Fordham E.J. (2013). Low-field permanent magnets for industrial process and quality control. *Prog. Nucl. Magn. Reson. Spect.*, **76**, 1-60.
73. Mitchell J. & Fordham E.J. (2014). Nuclear magnetic resonance core analysis at 0.3 T. *Rev. Sci. Instrum.* **85**, 111502, 1-17.

74. A. Valori, J. Mitchell & E.J. Fordham (2016). Digital filters for low-field NMR. *Concepts Magn. Reson. Part B*, **46B**, 202–220, e21346

Recent Developments

75. P.M. Singer, J. Mitchell & E.J. Fordham (2016). Characterizing dispersivity and stagnation in porous media using NMR flow propagators. *J. Magn. Reson.* **270**, 98 – 107.
76. J. Mitchell & E.J. Fordham (2017). Sodium-23 NMR in porous media. *Microporous & Mesoporous Materials*, in press (online 3 Feb 2017). Invited Lecture, 13th Int. Meeting on Magnetic Resonance in Porous Media “MRPM13”, Bologna, Italy, Sept 2016.
77. E.J. Fordham & J. Mitchell (2017). Localization in a single pore. *Microporous & Mesoporous Materials*, in press (online 26 May 2017). Proc. 13th Int. Meeting on Magnetic Resonance in Porous Media “MRPM13”, Bologna, Italy, Sept 2016.
78. E.J. Fordham, L. Venkataramanan, J. Mitchell & A. Valori (2017). What are, and what are not, Inverse Laplace Transforms. *Diffusion Fundamentals*, **29**, paper 2 (2017).
79. J. Mitchell, A. Valori & E.J. Fordham (2019). A robust nuclear magnetic resonance workflow for quantitative determination of petrophysical properties from drill cuttings. *J. Petrol. Sci. Eng.* **174**, 351–361.
80. J. Mitchell, A. Souza, E.J. Fordham & A. Boyd (2019). A finite element approach to forward modeling of nuclear magnetic resonance measurements in coupled pore systems. *J. Chem. Phys.* **150**, 154708.

Patents

Issued Patents:

1. R.T. Ramos & E.J. Fordham. “Optical probes”. US Patent 5,831,743 issued November 1998; GB 2,292,216 issued 10 March 1999.
2. X. Wu, E.J. Fordham, O.C. Mullins & R.T. Ramos. “Single-point optical probe for measuring three-phase characteristics of fluid flow in a hydrocarbon well”. US Patent 6,023,340 issued February 2000; GB 2,337,105 issued 14 Feb 2001.
3. Ramakrishnan, T.S., E.J. Fordham, W.E. Kenyon, L.M. Schwartz & D.J. Wilkinson. “Method for estimating pore structure in Carbonates from NMR measurements”. US Patent 6,040,696 issued March 2000.
4. E.J. Fordham, M. Flaum, T.S. Ramakrishnan, W.E. Kenyon & D. Allen. “Method for estimating rock petrophysical parameters from temperature-modified NMR data”. US Patent 6,115,671 issued September 2000; NO Patent 333,814 issued 23 September 2013; NL Patent 1,259,836 issued 26 April 2006; MX Patent 2,210,099 issued 23 June 2004; GB/FR/EP/DK/DE Patent 1,259,836 issued 26 April 2006; CA Patent 2,365,110 issued 30 December 2008.
5. E.J. Fordham & J. Mitchell. “System and method for emulating NMR well-logging tool diffusion-editing measurements on a bench-top NMR spectrometer for laboratory scale rock-core analysis”. US Patent 8,427,145 B2. Issued 23 April 2013.
6. E.J. Fordham, D. Freed, Y. Cheng & J. Edwards. “NMR Logging of Miscible Displacement”. US Patent 8,680,858, issued 25 March 2014.
7. E.J. Fordham & J. Mitchell. “System and method for emulating NMR well-logging tool diffusion-editing measurements on a bench-top NMR spectrometer for laboratory scale rock-core analysis”. US Patent 8,686,724 B2. Issued 1 April 2014. (Divisional of item 5).
8. J. Mitchell & E.J. Fordham. “Examining porous samples”. GB Patent 2,489,205 issued 20 August 2014; US Patent 9,588,067 issued 7 March 2017.
9. E.J. Fordham. “NMR sample containment”. GB Patent 2,506,851 issued 12 November 2014.
10. E.J. Fordham & J. Mitchell. “Magnetic resonance examination of porous samples”. US Patent 9,551,769 issued 24 January 2017
11. E.J. Fordham & C.P. Lenn. “Trapping magnetizable particles”. US Patent 9,579,661 issued 28 February 2017.
12. J. Mitchell & E.J. Fordham. “Examination of porosity by NMR and Intrusion Porosimetry”. US Patent 9,500,608 issued 22 November 2016; GB Patent 2,489,005 issued 25 November 2015.

13. J. Mitchell & E.J. Fordham. "NMR analysis of a core sample employing an open permanent magnet removable from a core holder". US Patent 9,696,269 issued 4 July 2017; GB Patent 2,516,792 issued 5 July 2017.
14. J. Mitchell & E.J. Fordham. "Determining properties of porous material by NMR". GB Patent 2,542,406 B issued 11 April 2018.

Filed Patents pending:

15. E.J. Fordham. "Sample holder for use in NMR". GB Patent Application GB2503220A, pub. 25/12/2013.
16. E.J. Fordham. "NMR Flowmeter with superconducting polarizer". US Patent Application 2014/0218023, pub. 7/8/2014.
17. E.J. Fordham & J. Mitchell. "Methods for determining capillary pressure and pore structure in rock core-plug analysis by magnetic resonance relaxation mapping" GB Patent application 2505232 published 26 Feb 2014.
18. S. Su, M.A. Giddins, D. Kuznetsov, P. Naccache, A. Clarke, E.J. Fordham, L. Hawkes, A. Howe, J. Mitchell & J. Staniland. "Enhanced Oil Recovery (EOR) chemical coreflood simulation study workflow". US Patent application 15/548762 filed 3 February 2016.
19. S. Su, M.A. Giddins, D. Kuznetsov, P. Naccache, A. Clarke & E.J. Fordham. "Multi-phase polymer shear viscosity calculation in polymer coreflood simulation study workflow". US Patent application 15/548763 filed 3 February 2016.
20. S. Su, M.A. Giddins, D. Kuznetsov, P. Naccache, A. Clarke & E.J. Fordham. "Modelling of fluid introduction and/or fluid extraction elements in simulation of coreflood experiment" US Patent application 15/548764 filed 3 February 2016.
21. J. Mitchell & E.J. Fordham, L. Zielinski, K. Viswanathan, K.D.R. Kausik. "Methods for interpreting NMR data" WO Patent application PCT/US2017/050010 filed 5 September 2017.

Other reports

- "An investigation of the de Haas-Shubnikov effect in an inversion layer on silicon" (1977). Undergraduate dissertation, Part II Experimental Physics, Cavendish Laboratory, May 1977. Investigation of low-temperature magnetoresistance in a system similar to those in which the Quantum Hall Effect was discovered.
- Report on Royal Society/SERC Industrial Fellowship, 1990–1992. *Reports on Researches*, Royal Society.
- > 80 internal reports, > 28 Invention Disclosures, 1985–2016, within Schlumberger.

Recent Invited Lectures

- "Instrumentation for Core-NMR: physical principles and practical implementation"
Topical Spring Conference, Soc. Petrophysicists & Well Log Analysts (SPWLA), Houston, TX, April 2016.
- "Localization in a single pore: How nuclear magnetism gets concentrated in small spots, in rocks and other porous media"
Institute of Physics – BRSG: Magnetic Resonance Group, workshop on "Understanding complex materials through Magnetic Resonance and Simulation", Dept Chem Eng & Biotechnology, Cambridge, July 2017.
Based on paper (item 76) at 13th Intl Conf on Magnetic Resonance in Porous Media ("MRPM13"), Bologna, Italy, Sept 2016.
- "Low-field NMR studies of Enhanced Oil Recovery processes"
Invited Lecture, 14th *Int. Conf. Magn. Reson. Microscopy ("ICMRM14")*, Halifax, Nova Scotia, August 2017

Professional Society Memberships and Service

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| Society of Petroleum Engineers | (Richardson, TX, USA) | since 1985 |
| Society of Core Analysts | (Fredericton, New Brunswick) | since 2011 |
| Institute of Physics | (London) | since 1990 |
| Interview Panel for CEng candidates from the Institute of Physics | | 1994 – 1995 |
| Fellowships Panel of the Institute of Physics | | 2002 – current |
| Executive Committee, Optical Sensors Collaborative Association (OSCA) | | 1994 – 1995 |