

William R. Rossen

Professor of Reservoir Engineering
Head of Petroleum Engineering Section
Department of Geoscience and Engineering
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CITIZENSHIP: U. S. A.

EDUCATION

Ph.D., Chemical Engineering, University of Minnesota, 1982

Dissertation under H. T. Davis and L. E. Scriven on modeling and experimental study of thermodynamics of surfactant-oil-water mixtures with application to Enhanced Oil Recovery (EOR). 3.88/4.0 GPA

S. B., Chemical Engineering, Massachusetts Institute of Technology, 1976
Merit Scholar, 1972-76. 4.78/5.0 GPA.

PROFESSIONAL REGISTRATION: Texas (through 2006)

ACADEMIC POSITIONS:

Delft University of Technology, Department of Geoscience and Engineering, Professor of Reservoir Engineering, since 2006.

Head of Petroleum Engineering Section, since 2007.

The University of Texas at Austin, Department of Petroleum and Geosystems Engineering, Professor, 2001 - 2006.

Chairman, Department of Petroleum and Geosystems Engineering, 2005-2006.

The University of Texas at Austin, Department of Petroleum and Geosystems Engineering, Professor, Associate Professor, 1995 - 2001.

Delft University of Technology, Delft, The Netherlands, Faculty of Applied Earth Sciences, Visiting Associate Professor, summer 1996.

The University of Texas at Austin, Assistant Professor, Department of Petroleum and Geosystems Engineering, Professor, 1989 - 1995

OTHER PROFESSIONAL EXPERIENCE:

Chevron Oil Field Research Co., La Habra, CA

1982-85: Research on design of surfactant formulations for enhanced oil recovery (EOR). Duties included conducting and supervising laboratory studies of the propagation and oil-recovery efficiency of surfactant formulations in corefloods.

1985-86: Transferred to long-range research group; continuing research in surfactant EOR. Additional responsibilities included mathematical modeling of flow through porous media and of surfactant process efficiency in the field.

1986-89: Research on foams for EOR, within same long-range research group.

Conducted experimental and theoretical studies of mechanisms of foam generation and propagation. Specific studies included percolation modeling of foam mobilization in porous media and fundamental modeling of foam yield stress in porous media.

HONORS AND AWARDS:

Award for "outstanding service" as an SPE Associate Editor, 2014.

Named Improved Oil Recovery Pioneer, SPE/DOE Symposium on Improved Oil Recovery, Tulsa, OK, 2012.

Named Best Instructor, Delft University of Technology, 2011.

Named Best Instructor, Faculty of Civil Engineering and Geosciences, 2011.

Listing in Marquis's Who's Who in the World, 2009-present

Distinguished Member Award, Society of Petroleum Engineers, 2006.

Distinguished Achievement Award for Petroleum Engineering Faculty, Society of Petroleum Engineers, 2002.

B. J. Lancaster Professor, University of Texas at Austin, 2005-2006.

Faculty Research Assignment, University of Texas at Austin, spring 2003.

Outstanding Technical Editor award, Society of Petroleum Engineers, October 2002.

George H. Fancher Centennial Teaching Fellowship in Petroleum Engineering, University of Texas at Austin, 1995 - 2005.

Outstanding Technical Editor award, Society of Petroleum Engineers, October 1996.

Academic Development Grant, College of Engineering, The University of Texas at Austin, 1994.

Faculty Leadership Award, Department of Petroleum Engineering, The University of Texas at Austin, 1994.

Lockheed Fort Worth Company Award for Excellence in Engineering Teaching in Petroleum Engineering, 1993.

Pioneer Corporation Faculty Fellowship, Department of Petroleum Engineering, The University of Texas at Austin, 1992-1995.

University Research Institute Summer Research Award, The University of Texas at Austin, 1992.

Engineering Foundation Advisory Council Faculty Award, College of Engineering, The University of Texas at Austin, 1992.

Faculty Leadership Award, Department of Petroleum Engineering, The University of Texas at Austin, 1991.

Doctoral Dissertation Fellow, 1978-79, and Corporate Associates Fellow, 1976-78, The University of Minnesota.

Haslam Cup (M.I.T. Department of Chemical Engineering award for professional promise in a senior), 1976.

Elected to Tau Beta Pi, 1976.

Merit Scholar, 1972-76.

MEMBERSHIP IN PROFESSIONAL AND HONORARY SOCIETIES:

Society of Petroleum Engineers

European Associate of Geoscientists and Engineers

Interpore Society

PROFESSIONAL SOCIETY AND MAJOR GOVERNMENTAL

COMMITTEES:

- Co-editor, special issue of *Transport in Porous Media* on "Foam in Porous media for Petroleum and Environmental Engineering: Experience Sharing"; expected publication 2019
- Member, Scientific Advisory Committee, National IOR Centre of Norway, 2016-present.
- Member, Organizing Committee, EAGE European Symposia on Improved Oil Recovery, Dresden, 2009-present.
- Member, Talent Council, Society of Petroleum Engineers (2010 - 2011).
- Member, Organizing Committee, EAGE European Symposium on Improved Oil Recovery, St. Petersburg, 2011.
- Member, Organizing Committee, EAGE European Symposium on Improved Oil Recovery, Paris, April 2009.
- Associate Editor, *Society of Petroleum Engineers Journal*, 2008-present.
- Recognized as "A Peer Apart" (reviewed 100 or more papers) by Society of Petroleum Engineers, 2007.
- Member, Technical Program Committee, International Petroleum Technology Conference, Kuala Lumpur, Malaysia, 2008.
- Technical Editor, Society of Petroleum Engineers, 1985-86, 1995-1999; 2001-present.
- Review papers for *Chemical Engineering Science*, *SPE Journal*, *Transport in Porous Media*, *Contaminant Hydrodynamics*, *Colloids and Surfaces A: Physicochemical and Engineering Aspects*.
- Review Chairman, Society of Petroleum Engineers journal *SPE Reservoir Evaluation and Engineering*, 1999-2001.
- Chairman, Technical Program Committee, SPE/DOE 11th Symposium on Improved Oil Recovery, April 2000.
- Member, Organizing Committee, 2002 Gordon Conference on Flow and Transport in Permeable Media.
- Member, Organizing Committee, 2002 EuroFoam Conference, Manchester, UK.
- Member, Scientific and Advisory Committee, Euroconference on Foams, Emulsions and Applications, Delft, June 2000.
- Member, Organizing Committee, 1998 SPE/DOE Symposium on Improved Oil Recovery
- Member, Organizing Committee, 1996 Gordon Conference on Modeling Flow in Permeable Media
- Member, Society of Petroleum Engineers (SPE) Educational and Professionalism Committee, 1994-97
- SPE Student Chapter Advisor, The University of Texas at Austin, 1990-92
- Member, SPE Ad Hoc Committee on Sister Chapters, 1992
- Member, Organizing Committee, 1990 SPE California Regional Meeting
- Member, Organizing Committee, 1988 SPE Forum on Enhancing Conformance

PUBLICATIONS

Refereed Archival Journal Publications

1. Tang, J., Ansari, M. N., and Rossen, W. R., "Quantitative Modeling of the Effect of Oil on Foam for Enhanced Oil Recovery," accepted for publication by *SPE Journal*. (SPE-194020-PA). <https://www.onepetro.org/journal-paper/SPE-194020-PA>
2. Fatemi, S. A., Jansen, J. D., and Rossen, W. R., "Discerning In-Situ Performance of an EOR Agent In the Midst of Geological Uncertainty: II. Fluvial-Deposit Reservoir," accepted for

- publication by *SPE Journal* (<https://doi.org/10.2118/174613-PA>)
3. Tang, J., Smit, M., Vincent-Bonnieu, S., and Rossen, W. R., "New Capillary Number Definition for Micromodels: the Impact of Pore Microstructure," *Water Resources Research* **55**, 1167-1178 (2019).
 4. Gong, J., Vincent-Bonnieu, S., Kamarul Bahrim, R. Z., Che Mamat, C. A. N. B., Groenenboom, J., Farajzadeh, R., and Rossen, W. R., "Laboratory Investigation of Liquid Injectivity in Surfactant-Alternating-Gas Foam Enhanced Oil Recovery," accepted for publication by *Transport in Porous Media*.
 5. Boeije, C. S., and Rossen, W. R., "SAG foam flooding in carbonate rocks," *J. Petroleum Science and Engineering* **171**, 843-853 (2018).
 6. Shah, S. Y., Wolf, K.-H.; Pilus, R., and Rossen, W. R., "Foam generation by capillary snap-off in flow across a sharp permeability transition," *SPE Journal* **24**, 116-128 (2019). <https://www.onepetro.org/journal-paper/SPE-190210-PA>
 7. Yu, G., Rossen, W. R., and Vincent-Bonnieu, S., "Coreflood Study of Effect of Surfactant Concentration on Foam Generation in Porous Media," *Industrial and Engineering Chemistry Research* **58**, 420-427 (2019)
 8. Alquaimi, B. I., and Rossen, W. R., "Foam Generation and Rheology in a Variety of Model Fractures," *Energy & Fuels* **33**, 68–80 (2019).
 9. Gong, J., Vincent Bonnieu, S., Kamarul Bahrim, R. Z., Groenenboom, J., Farajzadeh, R., and Rossen, W. R., "Modelling of Liquid Injectivity in Surfactant-Alternating-Gas Foam Enhanced Oil Recovery," accepted for publication by *SPE Journal*. <https://www.onepetro.org/journal-paper/SPE-190435-PA>
 10. Tang, J., Vincent Bonnieu, S., and Rossen, W. R., "Experimental Investigation of the Effect of Oil on Steady-State Foam Flow in Porous Media," *SPE Journal*. **24**, 140-157 (2019). <https://www.onepetro.org/journal-paper/SPE-194015-PA>
 11. AlQuaimi, B. I., and Rossen, W. R., "Study of foam generation and propagation in fully characterized physical-model fracture," *J. Petroleum Sci. and Eng.* **175**, 1169-81 (2019). Available at <http://doi.org/10.1016/j.petrol.2018.06.025>
 12. AlQuaimi, B. I., and Rossen, W. R., "Characterizing Foam Flow in Fractures for Enhanced Oil Recovery," *J. Petroleum Sci. and Eng.* **175**, 1160-68 (2019). Available at <https://doi.org/10.1016/j.petrol.2018.06.020>
 13. Gong, J., and Rossen, W. R., "Characteristic Fracture Spacing in Primary and Secondary Recovery for Naturally Fractured Reservoirs," *Fuel* **223**, 470–485 (2018).
 14. AlQuaimi, B. I., and Rossen, W. R., "Capillary Desaturation Curve for Residual Nonwetting Phase in Natural Fractures," *SPE Journal* **23**, 3, 788-802 (2018). <https://www.onepetro.org/journal-paper/SPE-189448-PA>
 15. Van der Meer, J., Farajzadeh, R., Rossen, B. & Jansen, J. D., "Influence of foam on the stability characteristics of immiscible flow in porous media," *Physics of Fluids* **30**, 1 (2018). DOI: 10.1063/1.5000891
 16. Kawale, D., Bouwman, G., Sachdev, S., Zitha, P., Kreutzer, M., Rossen, B. & Boukany, P., "Polymer conformation during flow in porous media " *Soft Matter* **46**, 1-11 (2017).
 17. Fatemi, S. A., Jansen, J. D., and Rossen, W. R., "Discerning in-situ performance of an EOR agent in the midst of geological uncertainty I: Layer cake reservoir model," *J. Petr. Sci. Eng.* **158**, 56–65 (2017).
 18. Gong, J., and Rossen, W. R., "Modeling flow in naturally fractured reservoirs: effect of fracture aperture distribution on dominant sub-network for flow, *Pet. Sci.* **14**, 138-154 (2017).

19. Kapetas, L., Vincent Bonniieu, S., Farajzadeh, R., Eftekhari, A.A., Mohd Shafian, S. R., Kamarul Bahrim, R. Z., Rossen, W.R., "Effect of permeability on foam-model parameters: an integrated approach from core-flood experiments through to foam diversion calculations," *Colloids and Surfaces A: Physicochem. Eng. Aspects* **530**, 172-180 (2017)
20. AlQuaimi, B. I., and Rossen, W. R., "New capillary number definition for displacement of residual nonwetting phase in natural fractures," *Geophys. Res. Lett.* **44**, 5368-5373 (2017). doi 10.1002/2017GL073211.
21. Al Ayesh, A. H., Salazar, R., Farajzadeh, R., Vincent-Bonniieu, S., and Rossen, W. R., "Foam Diversion in Heterogeneous Reservoirs: Effect of Permeability and Injection Method," *SPE Journal* **22**, 1402-1415 (2017) doi:10.2118/179650-PA
22. Kawale, D., Marques, E., Zitha, P. L. J., Kreutzer, M. T., Rossen, W. R., and Boukany, P. E., "Elastic instabilities during flow of hydrolyzed polyacrylamide solution in porous media: Effect of pore shape and salt." *Soft Matter* **13**, 765-775 (2017). DOI: 10.1039/C6SM02199A
23. Boeije, C. S., Vad Bennetzen, M., and Rossen, W. R., "A Methodology for Screening Surfactants for Foam Enhanced Oil Recovery in an Oil-Wet Reservoir," *SPE Reservoir Evaluation and Engineering* **20**, 795-808 (2017). doi.org/10.2118/185182-PA
24. Rossen, W. R., Ocampo-Florez, A.A., Restrepo, A., Cifuentes, H. D., Marin, J., "Long-Time Diversion in SAG Foam Enhanced Oil Recovery From A Field Test," *SPE Reservoir Evaluation and Engineering* **20**(1) (Feb. 2017), 1-7.
25. Gong, J, and Rossen, W. R., "Shape factor for dual-permeability fractured reservoir simulation: Effect of non-uniform flow in 2D fracture network," *Fuel* **184**, 81-88 (2016).
26. Farajzadeh, R., Eftekhari, A. A., Kahrobaei, S., Hajibeygi, van der Meer, H. J., Vincent-Bonniieu, S., and Rossen, W. R., "Simulation of Instabilities and Fingering in Surfactant Alternating Gas (SAG) Foam Enhanced Oil Recovery," *J. Natural Gas Sci. Eng.* **34**, 1191-1204 (2016).
27. Zeng, Y., Farajzadeh, R., Eftekhari, A. A., Vincent-Bonniieu, S., Muthuswamy, A., Rossen, W. R., Hirasaki, G. J., and Biswal, S. L., "Role of Gas Type on Foam Transport in Porous Media". *Langmuir* **32**, 6239–6245 (2016). DOI: 10.1021/acs.langmuir.6b00949
28. Jones, S. A., Laskaris, G., Vincent-Bonniieu, S., Farajzadeh, R., and Rossen, W. R., "Effect of Surfactant Concentration on Foam: From Coreflood Experiments to Implicit-Texture Foam-Model Parameters," *J. Ind. & Eng. Chem.* (2016) **37**, 268-276.
29. Jones, S. A., van der Bent, V., Farajzadeh, R., Rossen, W. R., and Vincent-Bonniieu, S., "Surfactant Screening for Foam EOR: Correlation between Bulk and Core-Flood Experiments," *Colloids Surfaces A: Physicochem. Eng. Aspects* (2016) **500**, 166-176.
30. Kapetas, L., Vincent-Bonniieu, S., Danielis, S., Rossen, W. R., Farajzadeh, R., Eftekhari, A. A., Mohd Shafian, S. R., and Kamarual Bahrim, R. Z. "Effect of Temperature on Foam Flow in Porous Media," *J. Ind. & Eng. Chem.* (2016) **36**, 229-237.
31. Lotfollahi, M., Farajzadeh, R., Delshad, M., Varavei, A., and Rossen, W. R., "Comparison of implicit-texture and population-balance foam models," *J. Natural Gas Sci. Eng.* **31**, 184-197 (2016).
32. Rossen, W.R. and Boeije, C. S., "Fitting foam-simulation-model parameters to data: II. surfactant-alternating-gas foam applications," *SPE Reservoir Evaluation and Engineering*, **18**(2), 273-283 (2015).
33. Boeije, C. S., and Rossen, W. R., "Fitting foam-simulation-model parameters to data: I. co-injection of gas and liquid," *SPE Reservoir Evaluation and Engineering*, **18**(2), 264-272 (2015).
34. Farajzadeh, R., Lotfollahi, M., Eftekhari, A. A., Rossen, W. R., and Hirasaki, G. J., "Effect

- of Permeability on Implicit-Texture Foam Model Parameters and the Limiting Capillary Pressure," *Energy and Fuels*, **29**(5), 3011-3018 (2015).
35. Mahani, H., Keya, A., Berg, S. Bartels, W. B, Nasralla, R., and Rossen, W. R., "Insights into the Mechanism of Wettability Alteration by Low-Salinity-Flooding (LSF) in Carbonate," *Energy and Fuels* **29**(3), 1352-1367 (2015).
 36. Nonnekes, L. E., Cox., S. J., and Rossen, W. R., "Effect of Gas Diffusion on Mobility of Foam for Enhanced Oil Recovery," *Transp. Porous Media* **106**(3), 669-689 (2015). DOI 10.1007/s11242-014-0419-z.
 37. Leeftink, T. N., Latooij, C. A., and Rossen, W. R., "Injectivity Errors in Simulation of Foam EOR," *J. Petroleum Sci. Eng.* **126**, 26–34 (2015). doi:10.1016/j.petrol.2014.11.026
 38. Boeije, C. S., and Rossen, W. R., "Gas Injection Rate Needed for SAG Foam Processes to Overcome Gravity Override," *SPE Journal* **20**, 49-59 (2015).
 39. de Velde Harsenhorst, R. M., Dharma, A. S., Andrianov, A., and Rossen, W. R., "Extension and Verification of a Simple Model for Vertical Sweep in Foam SAG Displacements," *SPE Reservoir Evaluation and Engineering*, **17**(3), 373-383 (2014).
 40. Namdar Zanganeh, M., Kraaijevanger, J.F.B.M., Buurman, H.W., Jansen, J.D., Rossen, W.R., "Challenges to adjoint-based optimization of a foam EOR process," *Computational Geosciences* **18** (3-4) 563–577 (2014). DOI: 10.1007/s10596-014-9412-4.
 41. Grassia, P., Mas Hernandez, E., Shokri, N., Cox, S., Mishuris, G., and Rossen, W. R., "Analysis of a Model for Foam Improved Oil Recovery," *J. Fluid Mech.* **751**, 346-405 (2014).
 42. Shojai Kaveh, N, Rudolph, E.S.J., Hemert, P. van, Rossen, W.R. and Wolf, K.H.A.A., "Wettability evaluation of a CO₂/water/Bentheimer sandstone system: Contact angle, dissolution, and bubble size," *Energy & Fuels*, **28**(6), 4002-4020 (2014).
 43. Namdar Zanganeh, M., and Rossen, W. R., "Optimization of Foam EOR: Balancing Sweep and Injectivity," *SPE Reservoir Evaluation and Engineering* **16**, 51-59 (2013).
 44. Farajzadeh, R., Andrianov, A., Krastev, R., Hirasaki, G. J., and Rossen, W. R., "Foam-Oil Interaction in Porous Media: Implications for Foam Assisted Enhanced Oil Recovery," *Advances in Colloid and Interface Science*, **183-184** (November 2012), 1-13.
 45. Ashoori, E., Marchesin, D., and Rossen, W.R., "Multiple Foam States and Long-Distance Foam Propagation in Porous Media," *SPE Journal* **17**, 1231-45 (2012).
 46. Ashoori, E., Marchesin, D., and Rossen, W.R., "Stability Analysis of Uniform Equilibrium Foam states for EOR Processes," *Transport in Porous Media* **92**, 573-595 (2012).
 47. Ashoori, E., and Rossen, W.R., "Can Formation Relative Permeabilities Rule Out a Foam EOR Process?," *SPE Journal* **17**(2), 340-351 (2012).
 48. Farajzadeh, R. Muruganathan, R. M., Rossen, W. R., and Krastev, R., "Effect of Gas Type on Foam Film Permeability and Its Implications for Foam Flow in Porous Media," *Adv. Colloid Surface Sci.*, **168** 71-78 (2011).
 49. Rossen, W. R., Venkatraman, A., Johns, R. T., Kibodeaux, K. R., Lai, H., and Moradi Tehrani, N., "Fractional Flow Theory Applicable to Non-Newtonian Behavior in EOR Processes," *Transport in Porous Media* **89**(2), 213-236 (2011).
 50. Balan, H. O., Balhoff, H. O., Nguyen, Q. P., and Rossen, W. R., "Network Modeling of Gas Trapping and Mobility in Foam EOR," *Energy and Fuels*, **25**(9), 3974-3987 (2011).
 51. Kil, R. A., Nguyen, Q. P., and Rossen, W. R., "Determining Trapped Gas in Foam From CT Images," *SPE Journal* **16**, 24-34 (2011).
 52. Namdar Zanganeh, M., Kam, S. I., LaForce, T. C., and Rossen, W.R., "The Method of Characteristics Applied to Oil Displacement by Foam," *SPE Journal* **16**, 8-23 (2011).

53. Ashoori, E., Marchesin, D., and Rossen, W.R., "Dynamic Foam Behavior in the Entrance Region of a Porous Medium," *Colloids and Surfaces A: Physicochem. Eng. Aspects.* **377**, 217–227 (2011).
54. Ashoori, E., Marchesin, D., and Rossen, W.R., "Roles of Transient and Local Equilibrium Foam Behavior in Porous Media: Traveling Wave," *Colloids and Surfaces A: Physicochem. Eng. Aspects.* **377**, 228–242 (2011).
55. Jamshidnezhad, M., van der Bol, L., and Rossen W. R., "Injection of Water above Gas for Improved Sweep in Gas IOR: Performance in 3D," *SPE Reserv. Eval. Eng.* **13** (4), 699-709 (Aug. 2010).
56. Li, Z., Rossen, W. R., and Nguyen, Q. P., "Three-Dimensional Modeling of Tracer Experiments to Determine Gas Trapping in Foam in Porous Media," *Energy & Fuels* **24**, 3239-3250 (2010).
57. Ashoori, E., van der Heijden, T. L. M., and Rossen, W. R., "Fractional-Flow Theory of Foam Displacements with Oil," *SPE Journal* **15** 260-273 (2010).
58. Rossen, W. R., van Duijn, C. J., Nguyen, Q. P., Shen, C., and Vikingstad, A. K., "Injection Strategies to Overcome Gravity Segregation in Simultaneous Gas and Water Injection Into Homogeneous Reservoirs," *SPE Journal* **15** 76-90 (2010).
59. Jamshidnezhad, M., Shen, C., Kool, P., and Rossen, W. R., "Improving injectivity to Fight Gravity Segregation in Gas Improved Oil Recovery," *SPE Journal* **15**, 91-104 (2010).
60. Nguyen, Q. P., Rossen, W. R., Zitha, P. L. J., and Currie, P. K., "Determination of Gas Trapping With Foam Using X-Ray CT and Effluent Analysis," *SPE Journal* **14**, 222-236 (2009).
61. Nguyen, Q. P., Zitha, P. L. J., Currie, P. K., and Rossen, W. R., "CT Study of Liquid Diversion with Foam," *SPE Production & Operations* (Feb. 2009), 12-21.
62. Rossen, W. R., "Comment on 'Verification of Roof Snap-Off at a Foam-Generation Mechanism in Porous Media at Steady State,'" *Colloids and Surfaces A: Physicochemical and Engineering Aspects* **322**, 261–269 (2008).
63. Huh, C., and Rossen, W. R., "Approximate Pore-Level Modeling for Apparent Viscosity of Polymer-Enhanced Foam in Porous Media," *SPE Journal* **13** (March 2008), 17-25.
64. Kam, S. I., Frenier, W. W., Davies, S. N., and Rossen, W. R., "Experimental Study of High-Temperature Foam for Acid Diversion," *Journal Petroleum Sci. Eng.* **58** 138–160, (2007).
65. Rossen, W. R., and Bruining, J., "Foam Displacements With Multiple Steady States," *SPE Journal* **12** (March 2007), 5-18.
66. Kam, S. I., Nguyen, Q. P., Li, Q., and Rossen, W. R., "Dynamic Simulations With an Improved Model for Foam Generation," *SPE Journal* **12** (March 2007), 35-48.
67. Chen, M., Rossen, W. R., and Yortsos, Y. C., "The Flow and Displacement in Porous Media of Fluids with Yield Stress," *Chemical Engineering Science*, **60** (15), August 2005, 4183-4202.
68. Chen, M., Yortsos, Y. C., and Rossen, W. R., "Pore-network study of the mechanisms of foam generation in porous media," *Phys. Rev.* **E 73** (2006).
69. Chen, M., Yortsos, Y. C., and Rossen, W. R., "Insights on Foam Generation in Porous Media from Pore-Network Studies," *Colloids Surfaces A: Physicochem Eng. Aspects* **256** (2-3), 181-189 (2005).
70. Kim, J. S., Dong., Y., and Rossen, W. R., "Steady-State Flow Behavior of CO₂ Foam," *SPE Journal* **10** (Dec. 2005), 405-415.
71. Xu, Q., and Rossen, W. R., "Experimental Study of Gas Injection in Surfactant-Alternating-Gas Foam Process," *SPE Reservoir Evaluation and Engineering* **7** (Dec. 2004), 438-448.

72. Cox, S.J., Neethling, S., Rossen, W.R., Schleifenbaum, W., Schmidt-Wellenburg, P., and Cilliers, J.J., "A Theory of the Effective Yield Stress of Foam in Porous Media: The Motion of a Soap Film Traversing a Three-Dimensional Pore," *Colloids Surfaces A: Physicochem Eng. Aspects* **245**, 143–151 (2004).
73. Rossen, W.R., and van Duijn, C.J., "Gravity Segregation in Steady-State Horizontal Flow in Homogeneous Reservoirs," *J. Petr. Sci. Eng.* **43**, 99-111 (2004).
74. Shan, D. and Rossen, W.R., "Optimal Injection Strategies for Foam IOR," *SPE Journal* **9** (June 2004), 132-150.
75. Kam, S. I., and Rossen, W. R., "A Model for Foam Generation in Homogeneous Porous Media," *SPE Journal* **8** (Dec. 2003), 417-425.
76. Rossen, W. R., "A Critical Review of Roof Snap-Off as a Mechanism of Steady-State Foam Generation in Homogeneous Porous Media," *Colloids Surfaces A: Physicochem Eng. Aspects*, **225** (1-3) 1-24 (2003).
77. Xu, Q., and Rossen, W. R., "Effective Viscosity of Foam in Periodically Constricted Tubes," *Colloids Surfaces A: Physicochem Eng. Aspects* **216** (1-3), 175-194 (2003).
78. Gauglitz, P.A., Friedmann, F., Kam, S. I, and Rossen, W.R., "Foam Generation in Homogeneous Porous Media," *Chem. Eng. Sci.* **57**, 4037-4052 (2002).
79. Cheng, L., Kam, S. I., Delshad, M. and Rossen, W.R., "Simulation of Dynamic Foam-Acid Diversion Processes," *SPE Journal* **7** (Sept. 2002), 316-324.
80. Kam, S. I., Gauglitz, P.A. and Rossen, W.R., "The Yield Stress of Foamy Sands," *Colloids Surfaces A: Physicochem Eng. Aspects* **202** (1), 53-62 (2002).
81. Kam, S. I. and Rossen, W.R., "The Compressibility of Foamy Sands," *Colloids Surfaces A: Physicochem Eng. Aspects* **202**, 63-70 (2002).
82. Kam, S. I., Gauglitz, P.A. and Rossen, W.R., "Effective Compressibility of a Bubbly Slurry: I. Theory of Behavior of Bubbles Trapped in Porous Media," *J. Colloid Interface Sci.* **241**, 248-259 (2001).
83. Kam, S. I, Gauglitz, P.A. and Rossen, W.R., "Effective Compressibility of a Bubbly Slurry: II. Fitting Numerical Results to Field Data and Implications," *J. Colloid Interface Sci.* **241**, 260-268 (2001).
84. Alvarez, J. M., Rivas, H., and Rossen, W.R., "A Unified Model for Steady-State Foam Behavior at High and Low Foam Qualities," *SPE Journal* **6** (Sept. 2001), 325-333.
85. Ali, S. A., Rossen, W.R. and Gauglitz, P.A., "Stability of Solids-Coated Liquid Layers Between Bubbles," *Industrial and Engineering Chemistry Research* **39**, 2742-2745 (2000).
86. Rossen, W.R., "Snap-Off in Constricted Tubes and Porous Media," *Colloids Surfaces A: Physicochem Eng. Aspects* **166**, 101-107 (2000).
87. Rossen, W.R., "Foam Generation at Layer Boundaries in Porous Media," *SPE Journal* **4**, 409-412 (Dec. 1999).
88. Rossen, W.R., Zeilinger, S.C., Shi, J.-X., and Lim, M.T., "Simplified Mechanistic Simulation of Foam Processes in Porous Media," *SPE Journal* **4**, 279-287 (Sept. 1999).
89. Rossen, W.R. and Wang, M.-W., "Modeling Foams for Acid Diversion," *SPE Journal* **4** (June 1999), 92-100.
90. Kam, S.I. and Rossen, W.R., "Anomalous Capillary Pressure, Stress and Stability of Solids-Coated Bubbles," *J. Colloid Interface Sci.* **213**, 329-339 (1999).
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SHORT COURSES

- "Fractional Flow Methods for Modeling Enhanced Oil Recovery," 2-day short course in connection with 2015 SPE Enhanced Oil Recovery Conference, Kuala Lumpur, Malaysia, Aug. 13-14, 2015.
- "Fractional Flow Methods for Modeling Enhanced Oil Recovery," 2-day short course for IMP (Mexican Petroleum Institute), Mexico City, 19-20 August 2014.
- "Foam for Enhanced Oil Recovery," (with Rouhi Farajzadeh), 5-day course, Kuala Lumpur, 8-12 July 2013.
- "Foam for EOR," one-day short course, Wintershall, Kassel, Germany, Aug. 31, 2010.
- Foam Workshop, one-day course given in conjunction with EAGE IOR Symposium, Paris, 26 April 2009
- "Foam for Enhanced Oil Recovery," four-day course for PEMEX, Ciudad Del Carmen, Mexico, 24-27 Nov. 2008

Delft Summer Schools

- Co-Chair and instructor at week-long short courses for industry and academe, given in summer.
- "Polymer and Surfactant Enhanced Oil Recovery," 2019
- "Foam and Mobility Control in Gas-Injection IOR and Aquifer Remediation," 2018.
- "Wettability and Low-Salinity Waterflooding," 2017
- "Gas and Solvent Enhanced Oil Recovery," 2016.
- "EOR in Carbonates" (in planning), 2015.
- "Chemical Enhanced Oil Recovery," 2014
- "Foam for Enhanced Oil Recovery," 2013.

ORAL PRESENTATIONS

Professional Society Presentations and Invited Presentations

- (those with papers which were included in conference Proceedings volumes or which were accepted for journal publication are listed with publications above)
- "A Laboratory Study of Foam for EOR in Naturally Fractured Reservoirs," Invited Presentation, National IOR Center of Norway conference "IOR Norway 2018," April 24-25, 2018.
- "Foams for EOR: Where are We, and What Could be the Opportunities to Advance This Technology?," IFP Energie Nouvelles, Dec. 15, 2017.
- "Fractional-Flow Models for Foam Enhanced Oil Recovery," invited presentation, Imperial College, London, UK, Oct. 7, 2016
- "A Laboratory Study of Foam for EOR in Naturally Fractured Reservoirs," 4th annual IOR Norway conference, Stavanger, Norway, April 24-25, 2018."Fractional-Flow Models for

- Foam Enhanced Oil Recovery," Imperial College, Oct. 7, 2016.
- "Don't Throw Away Your Class Notes! Two Applications of Basic reservoir Engineering Concepts to Enhanced Oil Recovery," Society of Petroleum Engineers Netherlands Section monthly meeting, The Hague, March 14, 2016.
- "Complexity and Simplicity in Modeling Foam Enhanced Oil Recovery," invited presentation, IFP Energie Nouvelles, Paris, France, 13 Nov. 2015.
- "Long-Time Diversion in SAG Foam Enhanced Oil Recovery From Field Data," invited presentation, Conoco-Phillips, Houston, Texas, Aug. 2015
- "Long-Time Diversion in SAG Foam Enhanced Oil Recovery From Field Data," Department of Petroleum and Geosystems Engineering, The University of Texas at Austin, Oct. 1, 2015.
- "Complexity and Simplicity in Modeling Foam Enhanced Oil Recovery," invited talk, Interpore Conference, 18-21 May 2015, Padua, Italy.
- "Industry-Academe Collaboration in EOR Research: An Academic Perspective," SPE Asia Pacific EOR Conference, Kuala Lumpur, Malaysia, 11-13 Aug. 2015
- "Fractional Flow Methods for Modeling Enhanced Oil Recovery," short course for IMP (Mexican Petroleum Institute), August 2014.
- "Complexity and Simplicity in Modeling Foam Enhanced Oil Recovery," Upstream Petroleum Symposium, King Abdulla University of Science and Technology, 14-15 Nov. 2014
- "Complexity and Simplicity in Modeling Foam Enhanced Oil Recovery," Shell Centennial Conference on "Rock & Fluid Physics: Academic and Industrial Perspectives," 15-17 Sept. 2014.
- "Fitting Foam Simulation Model Parameters to Data" and "Fitting Foam Simulation Parameters for SAG Foam Applications," Dept. of Chemical Engineering, Rice University, April 11, 2014.
- "A Remarkably Simple and Useful Model for Foam Enhanced Oil Recovery," Dept. of Petroleum and Geosystems Engineering, The University of Texas at Austin, 18 April, 2014
- "Why do people want to fracture shale-gas fields?," invited lecture, Fysica 2014, Leiden University, 1 April 2014.
- "A Remarkably Simple and Useful Model for Foam Enhanced Oil Recovery," Dept. of Petroleum Engineering, Louisiana State University, 27 Sept. 2013.
- "Foam for Enhanced Oil Recovery," Annual Petroleum Research School of Norway PhD Seminar, Stavanger, Norway, 2 Nov. 2012.
- "Foam Generation for Improved Sweep Efficiency in Enhanced Oil Recovery," Dept. of Petroleum Engineering, IFP Energie Nouvelles, 24 Oct. 2012.
- "Foam Generation for Improved Sweep Efficiency in Enhanced Oil Recovery," Dept. of Petroleum Engineering, Heriot-Watt University, 20 January 2012.
- "Gas trapping in foam flow in porous media: Modeling and experimental measurement," Interpore Society, Mini-Symposium on "Porous media research in the Netherlands; theory, experiments, models and applications," University of Utrecht, 6 Sept. 2011.
- "Foam Generation for Improved Sweep Efficiency in Enhanced Oil Recovery," Dept. of Earth Science and Engineering, Imperial College, London, 7 June 2011.
- "CO₂ EOR: Emerging Technologies for Improving Sweep Efficiency," Four Kingdoms Initiative, Symposium on "CO₂ EOR and its Impact on CCS Projects Economics," Damman Saudi Arabia, 28 Feb. 2011.

- "Foam for Improved Gas Sweep in Enhanced Oil Recovery," University of Bergen, Jan. 14, 2010.
- "60 Years of Petroleum Engineering Education and Research at Delft University of Technology: Lessons, Adaptation, and Innovation," SPE Netherlands 50th Anniversary Symposium, Rotterdam, Nov. 18, 2010.
- "Gravity Override in CO₂ EOR, and Foam," SPE Applied Technology Workshop on "CO₂ EOR Projects: Opportunities and Challenges in the Middle East," Abu Dhabi, Oct. 4-7, 2010.
- "CO₂ Foam," SPE Applied Technology Workshop on CO₂ EOR Projects: Opportunities and Challenges in the Middle East," Abu Dhabi, Oct. 4-7, 2010.
- "Fractional-Flow Analysis of EOR Processes." Wintershall, Kassel, Germany, Aug. 30, 2010.
- "Determining Trapped Gas in Foam in Porous Media from CT Images," Eufoam Conference, Borovets, Bulgaria, July 14-16, 2010.
- "Mechanisms of Foam in Porous Media: Gas Trapping and Effect of Oil," Rice University, Houston, TX, April 12, 2010.
- "3D Modeling of Tracer Experiments to Determine Gas Trapping in Foam In Porous Media," Shell International Exploration and Production, Bellaire, TX, April 12, 2010.
- "Gravity Segregation in Gas-Injection EOR," Occidental Petroleum Corporation, Houston, TX, April 14, 2010.
- "Gravity Segregation in Gas-Injection EOR" and "Insights from Fractional-Flow Modeling of Foam Made with CO₂-Soluble Surfactant," Hess Corporation, Houston, TX, April 13, 2010.
- "Challenges and Potential for SAG Foam EOR in Heterogeneous Reservoirs," Dept. of Petroleum and Geosystems Engineering, The University of Texas at Austin, April 8, 2010.
- "CO₂ Foam for Enhanced Oil Recovery," Saudi Aramco EXPEC ARC, Damman, Saudi Arabia, March 6, 2010.
- "Research in Petroleum Engineering at TU Delft," ExxonMobil Upstream Research, Houston, TX, April 5, 2010.
- "Preventing Gravity Segregation in CO₂ Enhanced Oil Recovery," Saudi Aramco Technology Quest – Upstream Innovation Symposium, Houston, TX, Nov. 2-3, 2009.
- "Studies of Foam Generation in Porous Media," Dept. of Chemical Engineering, Rice University, Oct. 9, 2009.
- "Foam: Overview of State of the Art," CEPSA Exploration and Production, Madrid, Sept. 17, 2009.
- "Principles of Application of Foam for Enhanced Oil Recovery," one-day short course, CEPSA, Madrid, Spain, Sept. 16, 2009.
- "Application of Foam for Enhanced Oil Recovery," one-day short course in conjunction with EAGE IOR Symposium, Paris, April 26, 2009.
- "3D Modeling of Tracer Experiments to Determine Gas Trapping in Foam in Porous Media," Dutch Petrophysical Society, Delft, The Netherlands, Feb. 19, 2009.
- "Foam Modeling Studies: Effects of Gravity and of Oil," Shell Foam Workshop, Rijswijk, The Netherlands, Dec. 1-2, 2008.
- "Research Experience in Foam for EOR," Shell Exploration and Production International, Rijswijk, April 9, 2008.
- "Gravity Segregation with Non-Newtonian Fluids," Dept. of Petroleum and Geosystems Engineering, The University of Texas at Austin, April 2, 2008.
- "Complexity and Simplicity in Modeling Oil Reservoirs," Intreerede (introductory lecture as

- Professor), Delft University of Technology, 21 Oct. 2007.
- "Advantages of Shear-Thinning Foam for Preventing Gravity Segregation in Gas Enhanced Oil Recovery," Eufoam conference, Noordwijk, The Netherlands, July 9, 2008.
- "Gravity Segregation in Gas-Injection and Foam Improved Oil Recovery," Dept. of Petroleum and Geosystems Engineering, The University of Texas at Austin, April 2, 2008.
- "Gravity Segregation in Gas-Injection and Foam Improved Oil Recovery," Department of Petroleum Engineering, Louisiana State University, 12 Feb. 2008.
- "Gravity Segregation in Gas-Injection and Foam IOR," Dept. of Earth Science and Engineering, Imperial College, Imperial College, London, 5 Dec. 2007.
- "Gravity Segregation in Gas IOR in Homogeneous Reservoirs," Shell Intl. E&P Co., Bellaire, TX, 13 April 2007.
- "Gravity Segregation in Gas IOR in Homogeneous Reservoirs," Shell Intl. E&P Co., Bellaire, TX, 2 Feb. 2007.
- "Research on Oil Recovery and Geosciences at TU Delft," ExxonMobil Upstream Research, Houston, TX, 1 Feb., 2007.
- "Applications of Foam in the Petroleum Industry," Shell Chemical Co., Amsterdam, 15 Dec., 2006.
- "Gravity Segregation in Gas and Foam IOR," Forum on Enhanced Oil Recovery, Beijing, China, 17 November, 2006.
- "Gravity Segregation in Gas and Foam Improved Oil Recovery," China University of Petroleum, Beijing, China, 16 Nov. 2006.
- "Gravity Segregation in Gas and Foam Improved Oil Recovery," Changqing Institute of Petrochina, Xian City, China, 13 Nov. 2006.
- "Studies of Foam Generation in Porous Media," FORCE Workshop on Foam, Stavanger, Norway, Sept. 29, 2006.
- "Gravity Segregation in Gas and Foam IOR," FORCE Workshop on Foam, Stavanger, Norway, Sept. 29, 2006.
- "Gravity Segregation in Gas IOR in Homogeneous Reservoirs," The University of Texas at Austin, Sept. 21, 2006.
- "Gravity Segregation in Gas IOR in Homogeneous Reservoirs," Department of Petroleum and Geosystems Engineering, The University of Texas at Austin, 21 Sept., 2006.
- "U.S. Perspectives on Exploiting Tight Gas Resources," EBN/TNO Tight Gas Workshop, Utrecht, 19 Sept., 2006
- "Foams for Mobility Control," invited lecture, Norway-North American Workshop on Petroleum Research Co-operation, Washington, DC, Nov. 2, 2005.
- "Foams for Mobility Control," invited lecture, SPE Advanced Technology Workshop on Chemical Flooding, Daqing, China, Sept. 25-29, 2005.
- "Theory and Modeling of Foam Generation in Porous Media," Kirkham Conference of Soil Science of America, Utah State University, Logan, UT, Oct. 27-29, 2004.
- "Steady-State Flow Behavior of Foam in Porous Media," 5th EuroConference on Foams, Emulsions and Applications, University of Marne-la-Vallee, Champs-Sur-Marne, France, July 5-8, 2004.
- "Gravity Segregation in Homogeneous Reservoirs," 13th European Conference on Mathematics in Industry, Eindhoven, The Netherlands, June 21-25, 2004.
- "Foam Displacements with Multiple Steady States," Dietz Laboratory, Faculty of Civil Engineering and Technical Geosciences, Delft University of Technology, Delft, The Netherlands, Feb. 5, 2004.

- "Yield Stress and Dynamic Viscosity of Foam in Porous Media," Department of Physics, Technical University of Twente, Twente, The Netherlands, May 19, 2003.
- "Foam Generation in Homogeneous Porous Media," Department of Chemical Engineering, The University of Southern California, Los Angeles, CA, June 4, 2003.
- "Application of Percolation Concepts to Foam Flow Through Porous Media," Science at the Edge seminar series, Michigan State University, East Lansing, MI, May 2, 2003.
- "Experimental Investigation of Foam Flow Under Extremely Dry Conditions," American Chemical Society National Meeting, Colloid Division symposium in honor of Clay Radke, New Orleans, LA, March 27, 2003.
- "Gravity Segregation in Gas Flooding in Homogeneous Reservoirs," ExxonMobil Upstream Research, Houston, TX, March 25, 2003.
- "Gravity Segregation in Steady-State Horizontal Flow in Homogeneous Reservoirs," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Austin, TX, March 20, 2003.
- "Effective Foam Yield Stress in Porous Media," informal presentation, Foam Physics Group, Department of Physics, Trinity College, Dublin, Ireland, Feb. 21, 2003.
- "Optimal Injection Strategies for Overcoming Gravity Override in Gas IOR," Dietz Laboratory, Faculty of Civil Engineering and Technical Geosciences, Delft University of Technology, Delft, The Netherlands, Feb. 14, 2003.
- "Laboratory Study of Foam Acid Diversion," Schlumberger Dowell, Sugar Land, TX, Sept. 12, 2002.
- "Foam Generation in Porous Media," Eurofoam Conference, Manchester, UK, July 10, 2002.
- "Foam Generation and Rheology in Porous Media," BP Institute, University of Cambridge, UK, Jan. 7, 2002.
- "Research Into Foams for Gas Diversion, Acid Diversion, and Environmental Remediation," Schlumberger Dowell, Sugar Land, TX, Nov. 7, 2001.
- "Foam Generation and Flow in Porous Media," University of Strasbourg, Strasbourg, France, June 19, 2001.
- "Dynamic Viscosity of Foam in Porous Media: Stability of Symmetric and Asymmetric Regimes," conference on Recent Developments in Foams, Ecole de Physique, Les Houches, France, June 13, 2001.
- "Optimal Injection Strategies for Foam IOR," Foam Workshop, Faculty of Applied Earth Sciences, Delft University of Technology, Delft, The Netherlands, May 28, 2001.
- "Foam Acid Diversion," Shell International Exploration and Production B. V., Rijswijk, The Netherlands, May 23, 2001.
- "Creation and Flow of Foam in Porous Media," Department of Chemical Engineering, University of Manchester Institute of Science and Technology, Manchester, UK, May 17, 2001.
- "Research on Foams for Gas Diversion," bp Research, Sunbury, UK, May 16, 2001.
- "Research on Foams for Gas Diversion and Matrix Acid Well Stimulation," Schlumberger Cambridge Research Center, Cambridge, UK, May 30, 2000.
- "Fractional-Flow Solution for Gravity Segregation in 2D Foam Flow," Faculty of Applied Earth Sciences, Technical University of Delft, Delft, The Netherlands, June 4, 1999.
- "Percolation Models for Foam Mobilization in Porous Media," Center for Mathematics and Computer Science, Amsterdam, The Netherlands, June 8, 1999.
- "Snap-Off and Foam Generation in Porous Media," Faculty of Applied Earth Sciences, Technical University of Delft, Delft, The Netherlands, June 17, 1999.

- "Research on Foams for Gas Diversion and Well Stimulation," Schlumberger Cambridge Research Center, Cambridge, England, Oct. 26, 1998.
- "Research on Foams for Gas Diversion and Well Stimulation," Faculty of Applied Earth Sciences, Technical University of Delft, Delft, The Netherlands, Oct. 21, 1998.
- "Research on Naturally Fractured Reservoirs and Foams," Chevron Petroleum Technology Company, La Habra, CA, Oct. 1, 1998.
- "Gravity Effects in Improved Oil Recovery Processes," Mobil Exploration and Production Technology Center, Dallas, TX, March 25, 1998.
- "Incorporation of Microstructural and Statistical Fracture Data into a Reservoir Model," Rocky Mountain Association of Geologists, Denver, CO, Jan. 20, 1998.
- "Simulation Studies of Foam Improved Oil Recovery," RESERVE Foam Workshop, Tromsø, Norway, June 13, 1997.
- "Foams in Porous Media," NATO Advanced Study Institute on Foams, Cargese, France, May 23, 1997.
- "Foam Diversion in Matrix-Acid Stimulation of Wells," Department of Petroleum Engineering, Texas A&M University, April 10, 1997.
- "Mechanisms of Stability of Armored Bubbles," Battelle Pacific Northwest Laboratories, Richland, WA, September 19, 1996.
- "Gravity Override in Foam Improved Oil Recovery," Faculty in Applied Earth Sciences, Delft Institute of Technology, June 5, 1996.
- "Measurement of Aperture and Multiphase Flow in Fractures Using NMR Imaging," Symposium on Fractured Petroleum Reservoirs and Aquifers, Geological Society of America South Central Meeting, Austin, TX, March 12, 1996.
- "Bubble Shapes and Foam Plugging of Porous Media," Foam Euroconference, Arcachon, France, May 28-June 2, 1996.
- "Experimental and Theoretical Studies of Armored Bubbles," Battelle Pacific Northwest Laboratories, Richland, WA, August 28, 1995.
- "Foams for Diversion in Well Stimulation," Technical University of Delft, Delft, The Netherlands, May 26, 1995.
- "Simplified Mechanistic Modeling of Foams for Improved Oil Recovery," Technical University of Delft, Delft, The Netherlands, May 24, 1995.
- "Foam Diversion in Matrix Acidization," Koninklijke/Shell Exploratie en Productie Laboratorium, Rijswijk, The Netherlands, May 23, 1995.
- "Stabilizing Mechanisms of Armored Bubbles," Battelle Pacific Northwest Laboratories, Richland, WA, March 24, 1995.
- "Simplified Mechanistic Modeling of Foam Processes for Improved Oil Recovery," Second International Workshop on Reservoir Application of Foam. Røros, Norway, March 2, 1995.
- "Modeling Foams in Porous Media," IKU/Sintef Group, Trondheim, Norway, Feb. 28, 1995.
- "Foam Diversion in Matrix Acidization," RF Rogaland Research, Stavanger, Norway, Feb. 27, 1995.
- "Modeling Foams in Porous Media," École Supérieure de Physique et Chimie Industrielles de la Ville to Paris, Paris, France, March 17, 1994.
- "Rheology of Foams in the Petroleum Industry," Battelle Pacific Natural Resources, Hanford, WA, Jan. 13, 1994.
- "Two-Phase Relative Permeabilities in Natural Fractures," Lawrence Berkeley Laboratory, Berkeley, CA, July 9, 1993.

- "Fractional-Flow Modeling of Foam Diversion in Matrix Acidization," Soc. Petr. Eng. Forum on Near-Wellbore Stimulation, Bali, Indonesia, May 9-14, 1993.
- "Foam Diversion in Matrix Acidization of Sandstones," poster presentation, Symp. on Field Applications of Foams for Oil Recovery, Bakersfield, CA, Feb. 11-12, 1993.
- "Percolation Models for Foam Mobilization in Porous Media," Laboratoire Énergétique et Phénomènes de Transfert, École Nationale Supérieure d'Arts et Métiers, Talence, France, Jan. 8, 1993.
- "Single and Two-Phase Flow in Natural Fractures," Laboratoire Énergétique et Phénomènes de Transfert, École Nationale Supérieure d'Arts et Métiers, Talence, France, Jan. 7, 1993.
- "Modeling Foam Processes at 'The Limiting Capillary Pressure'," Institut Français du Pétrole, Rueil Malmaison, France, Jan. 5, 1993.
- "Modeling Foams in Porous Media," Department of Chemical Engineering, The University of Michigan, Ann Arbor, MI, Oct. 22, 1992.
- "Modeling Two-Phase Flow in Fractures," Gordon Conference on Fluids in Permeable Media, Plymouth, NH, Aug. 10-14, 1992.
- "Network Modeling of Foam Mobilization in Porous Media," ACS Colloid and Surface Science Symposium, Morgantown, WV, June 14-17, 1992.
- "Modeling Foams for Mobility Control in Enhanced Oil Recovery Processes," Department of Petroleum Engineering, Texas A&M University, Feb. 28, 1992.
- "Rheology of Foam in Porous Media at the 'Limiting Capillary Pressure'," Koninklijke/Shell Exploratie en Productie Laboratorium, Rijswijk, The Netherlands, May 29, 1991.
- "Separating Relative Permeability and Viscosity in Foam Rheology," Technical University of Delft, Delft, The Netherlands, May 28, 1991.
- "Separating Relative Permeability and Viscosity in Foam Rheology," Institut Français du Pétrole, Rueil Malmaison, France, May 24, 1991.
- "Modeling 'Strong' Foam Mobility in Porous Media," Petroleum Recovery Institute, Calgary, Canada, May 26, 1991.
- "Capillary Resistance for Foam Flow in Porous Media," Gordon Conference on Fluids in Permeable Media, Tilton, NH, July 24-28, 1989.
- "Foam Mechanisms," Department of Petroleum Engineering, University of Southern California, Feb. 8, 1989.

GRANTS AND CONTRACTS

- "Optimization of Surfactant Foam Flooding for a Low-Permeability Carbonate Field in the Sultanate of Oman," Shell Global Solutions International B.V., €180,000, 2018-19.
- "Trapped gas characterization in foam floods," Shell Global Solutions International B.V., €350,788, 2017-2019.
- "Liquid injectivity in SAG processes," Shell Global Solutions International B.V., €179,688, 2017.
- "The Effect of Oil on Foam," subcontract through University of Technology Petronas, with involvement by Shell and Petronas, approx. €400,000, 2015-2019.
- "Foam Generation in Vertical Flow Across Heterogeneities," subcontract through University of Technology Petronas, with involvement by Shell and Petronas, approx. €400,000, 2015-2019.
- "Foam for Enhanced Oil Recovery," Joint Industry Project supported by ConocoPhillips, GDF Suez, PEMEX, Equión Energía, Shell, €750,000. 2014-2018.
- "Percolation Concepts Applied to Flow in Fractured Reservoirs." Saudi Aramco, €60,000.

2013-2016.

"Relating Polymer Rheology to Performance in EOR," Dutch Polymer Institute, €289,730, 2012-2016.

"Foam in Carbonate Formations," Maersk oil, €400,000, Dec. 2010-Dec. 2014.

"Nanoparticle-Stabilized Foam in Porous Media," Shell Game-Changer program, €30,000, Nov. 2010-March 2011.

"Early Observability of EOR Process Effectiveness," Shell Recovery Factory program, €300,000, Nov. 2010-Oct. 2014.

"CO₂ Storage in Depleted Gas Fields," CATO2 program, Dec. 2010, approx. €300,000, Dec. 2010-Dec. 2013.

"Remediating Casing Leaks in CO₂ sequestration," CATO2 program, Dec. 2010-Dec. 2014, approx. €100,000.

"Sweep Efficiency in CO₂ Enhanced Oil Recovery," Saudi Aramco, approx. €10,000/yr, 2008-2010.

"Foundations for Field Application of CO₂ Foam: Laboratory and Modeling Studies," Joint Industry Project funded by Shell, Total and Statoil, €382,500, Nov. 2008-Nov. 2011,

"Real-Time Optimization of an EOR Process," ISAPP (Integrated Systems Approach to Petroleum Production) program, approx. €300,000, fall 2007-fall 2011.

Unrestricted research grant, Occidental Petroleum, \$60,000, 2005.

Unrestricted research grant, Halliburton, \$15,000, 2005.

"A Model for Foam Generation in Porous Media," Petroleum Research Fund of the American Chemical Society, \$80,000, 2005-2007.

Unrestricted research grant, Schlumberger Inc., 2002, \$60,000.

"Mechanistic Studies of Foam EOR Processes," U.S. DOE, 2001-2004, \$639,522.

"Development of More-Efficient Gas Flooding Applicable to Shallow Reservoirs," U.S. DOE, 1999-2002, \$888,429 (with G. A. Pope and R. L. Johns).

"Foam-Enhanced Sweep in Surfactant Subsurface Remediation," Texas Higher Education Coordinating Board, Advanced Technology Program, 2000-2001, \$155,224 (with M. Delshad).

"Foams for Enhanced Oil Recovery," Enhanced Oil and Gas Recovery Research Program (with R. S. Schechter to 1994) - 1991-92: \$60,000; 1992-93: \$40,000; 1993-94: \$25,000; 1994-95: \$40,000; 1995-96: \$20,000; 1996-97: \$20,000; 1997-98, \$20,000; 1998-1999, \$25,000; 1999-2000: \$25,000.

"Foam Diversion," Improved Well Performance program: 1998: \$30,000; 1999: \$30,000.

Unrestricted research grant, Mobil Corporation, 1998: \$15,000.

"Mobility Control with a Viscous Mixing Zone," Enhanced Oil and Gas Recovery Research Program - 1996-97: \$20,000; 1997-98, \$20,000.

"Mechanisms of Bubbles in Sludges and Slurries: Modeling Studies of Particular Materials," U. S. DOE, 1997, \$153,000.

"Foam Diversion in Acid Stimulation: Basic Mechanisms" and "Mechanisms of Plugging, Diversion and Fluid Loss with Foams," - Stimulation, Logging and Formation Damage Research Program: 1990: \$10,500; 1991: \$34,434; 1992: \$35,800; 1993: \$41,743; 1994: \$51,248; 1995: \$61,188; 1996; \$30,000; 1997; \$30,000.

"Using Microstructure Observations to Quantify Fracture Properties and Improve Reservoir Simulations" (with Bureau of Economic Geology and Department of Geological Sciences), BDM Oklahoma (sub-contractor for DOE), total project \$750,000, 1996.

"Foam Gels," Enhanced Oil and Gas Recovery Research Program - 1995-96: \$20,000.

"Fractured Reservoirs," Enhanced Oil and Gas Recovery Research Program (with M. A. Miller and K. Sepehrnoori) - 1990-91: \$14,000; 1991-92: \$40,000; 1992-93: \$24,000; 1993-94: \$25,000; 1994-95: \$20,000; 1995-96: \$25,000.

"Mechanisms of Bubble Stabilization by Solid Particles," Battelle Pacific National Laboratories, 1995: \$16,000.

"A Systematic Procedure for Reservoir Characterization," Enhanced Oil and Gas Recovery Research Program (with L. W. Lake and G. A. Kocurek) - 1991-92: \$33,000; 1992-93: \$31,000; 1993-94: \$30,000; 1994-95: \$35,000.

"Improved Well Stimulation With Foams," Texas Advanced Technology Program, 1994-95: \$179,461.

"Mechanisms of Foam Enhanced Oil Recovery," Petroleum Research Fund of American Chemical Society, 1993-95: \$50,000.

"Laboratory Study and Mathematical Modeling," State Lands Energy Recovery Optimization Program, 1990-92 (with M. M. Sharma): \$22,531.

"Percolation of Bingham Fluids in Porous Media," Petroleum Research Fund of American Chemical Society, 1990-92: \$18,000.

"Relative Permeabilities in Two-Phase Flow in a Single Fracture," Petrophysics Research Program - 1991: \$7,500; 1992: \$7,500.

"Percolation and Nonlinear Transport in Networks: Electrical and Mechanical Properties of Composite Materials and Flow Through Porous Media," University Research Institute Summer Research Award, 1992: \$8,000.

"Mechanisms of 'Weak' Foams at Concentrations Below the Critical Micellar Concentration," Enhanced Oil and Gas Recovery Research Program, 1990-91: \$12,000.

"Capillary Pressure and Permeability in Layered Media," Enhanced Oil and Gas Recovery Research Program, 1990-91: \$10,000.

"Rheology of 'Strong' Foams at the 'Limiting Capillary Pressure'," Enhanced Oil and Gas Recovery Research Program, 1990-91: \$11,000.

"Foam Generation in Heterogeneous Media," Enhanced Oil and Gas Recovery Research Program, 1990-91: \$14,000.

Special Equipment Grant, College of Engineering, 1989: \$50,000.

Research Development Grant, Bureau of Engineering Research, 1989, \$5,000.

Start-up grant, Department of Petroleum Engineering, 1989: \$5,000.

Grants for research from: Chevron Corporation, 1993 (\$7,500); Texaco, 1990 (\$15,000), 1991 (\$15,000), 1992 (\$10,000); Mobil R&D Corporation, 1992 (\$5,000).

COURSES TAUGHT

University of Texas at Austin

undergraduate

Transport Phenomena in Geosystems Engineering
 Introduction to Geostatistics
 Physical and Chemical Behavior of Petroleum Fluids II

graduate

Transport Processes in Petroleum Engineering
 Fractional-Flow Methods
 Enhanced Oil Recovery II
 Reservoir Applications of Foam

Delft University of Technology

BSc

Physical Transport Phenomena
Fluid Flow, Heat and Mass Transfer
Field Exploration Project (reservoir engineering part)

MSc

Rock-Fluid Interactions I
Rock-Fluid Interactions II

participate in

Field Development Project (MSc)
Non-Thermal Methods of Enhanced Oil Recovery
Introduction to Offshore Engineering
Introduction to Petroleum Engineering
Special Topics in Petroleum Engineering
Geothermal Energy
Offshore Pipelines

EVIDENCE OF TEACHING EFFECTIVENESS

Delft University of Technology:

Named Best Instructor, Delft University of Technology, 2011.
Named Best Instructor, Faculty of Civil Engineering and Geosciences, 2011.

University of Texas:

Voted best teacher in department by Department Budget Council, 1999.
Consistently high teaching evaluations from students

Major Departmental and College teaching awards:

- Faculty Leadership Award, Department of Petroleum Engineering, The University of Texas at Austin, 1994 and 1991.
- Lockheed Fort Worth Company Award for Excellence in Engineering Teaching in Petroleum Engineering, 1993.
- Engineering Foundation Advisory Council Faculty Award, College of Engineering, The University of Texas at Austin, 1992.

Ph.D. SUPERVISIONS COMPLETED

Delft University of Technology, 2006-present

Bander AlQuaimi, "Investigation of Foam Generation, Propagation and Rheology in Fractures," 2017.

Jiakun Gong, "Effect of Non-Uniform Flow in Fracture Networks on Recovery From Naturally Fractured Reservoirs," 2017

Durgesh Kawale, "Elastic Instabilities in Polymer-Solution Flow Through Porous Media," 2017 (with Profs. Zitha and Kreuzer and Dr. Boukany).

Chris Boeije, "Experimental and Modeling Studies of Foam Enhanced Oil Recovery," 2016.

Elham Ashoori, "Foam for Enhanced Oil Recovery: Modeling and Analytical Solutions," 2012.

Maryam Namdar Zanganeh, "Simulation and Optimization of Foam EOR Processes," 2011.

University of Texas, 1989-2006

Chun Shen, "Experimental and Simulation Study Of Foam in Porous Media," 2006.

Qichong Li, "Foam Generation and Propagation in Homogeneous and Heterogeneous Porous Media," 2006.

- Qiang Xu, "Theoretical and Experimental Study of Foam for Enhanced Oil Recovery and Acid Diversion," 2003.
- Jiann Gwo Rong, "Experimental Evaluation of Foam in Environmental Remediation," 2002.
- Liang Cheng, "Modeling and Simulation Studies of Foam Processes in Improved Oil Recovery and Acid-Diversion," 2002.
- Seung I. Kam, "Interactions Between Bubbles and Solids: Three Applications," 1998.
- Jose M. Alvarez Martinez, "Foam-Flow Behavior in Porous Media: Effects of Flow Regime and Porous-Medium Heterogeneity," 1998.
- Kenneth R. Kibodeaux, "Experimental and Theoretical Studies of Foam Mechanisms in Enhanced Oil Recovery and Matrix Acidization Applications," 1997.
- Jianxin Shi, "Simulation and Experimental Studies of Foam for Enhanced Oil Recovery," 1996.
- Sabine C. Zeilinger, "A Modeling and Experimental Study of Foam in Acid Diversion and Enhanced Oil Recovery," 1996.
- Arun T. A. Kumar, "Single- and Two-Phase Flow in Natural Fractures, and Other Aspects of Scale-Up of Two-Phase Flow in Porous Medium," 1996.
- Zuhui Zhou, "Modeling Foam Flow in Porous Media and Applications to EOR and Acidization," 1994.
- Gang Wu, "Pore-Network Evolution Induced by Interaction Between Minerals and Migrating Fluids: Implications for Rock Diagenesis," 1992 (co-supervisor, L. W. Lake).

M.S. THESIS SUPERVISIONS COMPLETED

Delft University of Technology, 2006 - present

- H. A. Syuki, "Experimental Study: Foam Generation and Propagation in Flow Across a Permeability Contrast. 2018.
- W. J. Flores Martinez, "Liquid Injectivity in SAG Foam EOR," 2018.
- R. V. D'Silva, "Effect of oil on Foam Displacements: CT Coreflood and Data Fitting," 2018.
- H. A. Sukri, "Experimental Study: Foam Generation and Propagation," 2018.
- A. Sulistyono, "Injection of Water above Gas for Improved Sweep in Gas EOR: Non-uniform Injection and Sweep," 2017.
- A. Amin, "Simulation of Foam Front Propagation Through a Waterflooded Reservoir for Enhanced Oil Recovery," 2016.
- F. Asrul, "Fluid Flow in Fracture Reservoir," 2016
- G. Laskaris, "Effect of surfactant concentration, water treatment chemicals, fatty acids and alcohols on foam behavior in porous media and in bulk," 2015.
- M. N. Ansari, "Modelling the effect of oil on foam for EOR: Local equilibrium behavior," 2015.
- R. Ranjan, "Simultaneous Injection of Water Above Gas for Improved Sweep in Gas EOR: An Analytical and Simulation Study of Non-Uniform Injection and Sweep," 2015.
- R. Heins, "Modelling the effect of oil on foam with the wave curve method," 2015.
- G. Yu, "Analytical and Simulation study of Sweep Efficiency in Gas-Injection EOR," 2015.
- W. A. van El, "Modeling Dispersion and Mixing in EOR," 2015.
- S. Danelis, "Temperature Effect of Foam Coreflood Experiments," 2015.
- M. Nell, "Oil foam interaction: Simulation of foam displacement with oil," 2015.
- N. Ligtenburg, "Small Scale Laboratory Experiments with Environmentally Friendly Friction Reducers with Application in Slickwater Fracturing Treatments," 2014.
- A. L. Keya, "Understanding the Mechanisms of Low-Salinity Flooding in Carbonates using

- Model Systems," 2014.
- B. J. Ubbink, "Controlled Precipitation of Calcium-Carbonate in spatial dimension with multiple Calcium-Chloride and Sodium-Carbonate pulses," (with Leon van Paassen) 2013.
- A. S. Dharma, "Simulation Studies of Foam for Enhanced Oil Recovery," 2013.
- A. A. A. Hussein, "Foam Stability in Presence of Oil: A Simulation and Simulation Study," (co-advisor with R. Farajzadeh), 2013.
- N. Mahalle, "Injection of water above gas for improved sweep in Gas IOR: Non-uniform Injection and Sweep," 2013 (co-advisor with R. Farajzadeh).
- L. F. van Zelm, "Evaluation of Post-Fracture Production in Tight Gas Reservoirs: The Impact of Unconventional Reservoir Behaviour on Production and Well Test Interpretation," 2010.
- M. K. Liu, "Modelling CO₂ Foam Displacements for Enhanced Oil Recovery," 2010.
- A. Faisal, "Injectivity and Gravity Segregation in WAG and SWAG Enhanced Oil Recovery," 2009.
- N. Moradi Tehrani, "Feasibility Study of Steam/Foam and CO₂/Foam Injection Into Naturally Fractured Reservoirs," 2009.
- T. L. M. van der Heijden, "Modeling of Miscible CO₂ Foam Displacements with Oil," 2009.
- M. B. Kloet, "Optimal Design Criteria for SAG Foam Processes in Heterogeneous Reservoirs," 2008.
- F. R. van Gool, "Simulation of Fingering in Liquid Injection after Foam using a Herschel-Bulkley Rheology Model," 2008.
- P. Smits, "Construction of an Integrated Reservoir Model Using the Moerkapelle Field for Geothermal Development of the Delft Sandstone," (co-supervision with K. H. Wolf), 2008.
- M. A. van der Most, "The Analysis of Directional Permeability of Fractured Reservoirs: A Case Study from the Tata Area, Morocco," 2008.
- W. J. Renkema, "Success of SAG Foam Processes in Heterogeneous Reservoirs," 2007.
- Linda van der Bol, "Evaluation in Three Dimensions of Injection of Water above Gas for Improved Sweep in Gas IOR," 2007.
- G. H. Stolwijk, "The effect of Reservoir Heterogeneity on Gravity Segregation in Gas IOR," 2007.
- B. Zhumabek, "Gravity Segregation in Gas-Injection IOR with WAG: Effect of Slug Size," 2007.

University of Texas, 1989-2006

- Jisung Kim, "Experimental Study of Dense CO₂ Foam-Flow Behavior in Porous Media at Elevated Pressure," 2003, The University of Texas at Austin.
- Yan Dong, "Experimental Study of CO₂ Foam Flow in Porous Media and Application of Fractional-Flow Method to Foam Flow," 2001, The University of Texas at Austin.
- Dan Shan, "Simulation Study of Gravity Override for Foam Processes," 2001, The University of Texas at Austin.
- Arlén Bethe Reme, "Parameter Fitting and Calibration Study with a Commercial Foam Simulator," Diploma Thesis, Faculty of Applied Earth Sciences, Norwegian University of Science and Technology (1999).
- Yaguang Gu, "Simulation Study of Aggregate Properties of Natural Fracture Systems," 1998, The University of Texas at Austin.

Jose M. Alvarez Martinez, "Effects of Oil on Foam Stability," 1996, Department of Petroleum and Geosystems Engineering, The University of Texas at Austin.

Kenneth R. Kibodeaux, "Mechanisms of 'Weak' Foams," 1992, Department of Petroleum and Geosystems Engineering, The University of Texas at Austin.

BSc. THESIS SUPERVISIONS COMPLETED

Delft University of Technology, 2006 - present

W. Glerum, "Convection and diffusion behaviour of a gas in a foam through a porous medium, 2019.

M. Bui, "Foam Stability in the Presence of Oil," 2018.

M. Sotomayor, "Foam-Front Tracking in a Multi-Layered Reservoir," 2018.

L. Qian, "The Impact of Grid Refinement on Gas and Liquid Injectivity in SAG Foam EOR," 2018.

H. Perrin, "Simulation of Parameter Fitting of Steady State Flow," 2018.

A. Verma, "2D Model of Capillary Boundary Effect in Gas-Water Flow," 2018.

S. Ghafari, "Spatial characteristics of compressed sand," (with K.-H. Wolf), 2017

M. W. Smit, "A New Definition for Capillary Numbers in Microfluidic Models," 2017.

M. Bos. " Numerical Simulation of Radial Non-Newtonian Foam Flow in a Reservoir," 2017.

C. Beanland, "Development of a Multiphase Gas-Water Simulator for 2D Flow," 2017.

C. G. Ponnens, "SAG Foam EOR: Buckley-Leverett Fractional Flow Theory for Non-Newtonian Foam Rheologies," 2017.

A. Gori, "Representation of Natural Rock Fractures as 2D Pore Networks," 2017.

P. P. de Graaf, "Characterization of Fracture Wall Roughness and Pore Body and Pore Throat Network," 2016.

T. A. Chorus, "Pressure distribution in naturally fractured reservoirs and its relation to unsteady heat conduction," 2015

M. Wijsman, "Effect of Foaming Surfactants on the Wetting of Oil-Wet Media," 2015.

D. H. van der Valk, "Heat Conduction Algorithm," 2015.

J. J. F. Schut, "An Effective Flow Path of Fractures in Naturally Fractured Reservoirs with Primary and Secondary Recovery," 2015.

T. Sharma and M. B. Hahn, "Efficient Numerical Modeling of Naturally Fractured Reservoirs in Primary and Secondary Recovery," 2015.

M. Koops, "Influence of Transient Effects on Fitting Parameters to SAG Foam Core-Floods," 2014.

R. S. Chhanai, "Primary and Secondary Recovery from Naturally Fractured Reservoirs," 2014.

M. H. Ammiwala, "Efficient Representation of Naturally Fractured Reservoirs," 2014.

R. Heins, "Behavior of oil relative permeability in porous media during foam flooding," 2013.

W. A. van El., "Modeling Dynamic SAG Foam Floods," 2013.

S. Snip, "Displacement of Miscible Fluids in Micro Porous Media," 2013 (co-advisor with H. Guo).

T. N. Leeftink, "Injectivity Errors in Simulation of Foam EOR," 2013.

C. A. Latooij, "Injectivity in Non-Newtonian Two-Phase Flow," 2012.

L. S. Bouman, "Separating Convection from Diffusion in a Model of Dispersion in Fluid Injection in Forward Flow," 2012.

R. M. de Velde Harsenhorst, "A Model for Gas Sweep with Foam," 2012.

L.E. Nonnekes, " Effect of Diffusion on Foam Bubble Size Distribution and Gas Mobility: an

- Idealized 2D Model," 2011.
R. A. Kil, "Convection and Diffusion of Tracer through Foam in Porous Media," 2008.
K. Bisdom, "Gravity Segregation in WAG EOR in Homogeneous Reservoirs," 2008.
P. Kool, "A Reservoir Simulation With a Power-Law Fluid for IOR," 2008.

Ph.D. IN PROGRESS

Kai Li
Xiaocong Lyu (with Denis Voskov)
Guanqun Yu
Swej Shah
Ahmed Hussain
Rodrigo Salazar
Jinyu Tang
Amin Fatemi

MSc. THESES IN PROGRESS

UNDERGRADUATE RESEARCH SUPERVISION

Delft University of Technology, "research minor" projects, 2006-present

- S. F. ter Haar, "A Buckley-Leverett Model for Shear-Thinning SAG for Enhanced Oil Recovery," 2017
R. van Katz, "Experimental investigation of the effect of initial condition on foam-oil concurrent flow," 2017
Jelmer Schut, "Primary and Secondary Recovery from Naturally Fractured Reservoirs," 2014-15

University of Texas, independent-study projects, 1989-2006

- Fulber del Mundo, "Experimental Measurement of Foam Texture," 2002
Navanit Arakeri, "1D Finite-Difference Simulator," 2000-2001
Farid Zouiouche, "Bubble Shapes in Simple Pores," 1997
Witteveld, Andrew, "Analyses of Post-Foam Liquid Injection," 1997
Walker, Jacob, "A Simple Model for Foams at Low Qualities," 1997
Ali, Syed, "Stabilizing Mechanisms of Armored Bubbles," 1995
Malanga, Robert, "Threshold for Flow in Hierarchical Diamond Lattice," 1994
Roberts, Matthew, "Threshold for Flow in Hierarchical Diamond Lattice," 1993
Hartsfield, Juan, "Bingham Flow in Porous Media," 1992-93
Sikandar, Ali, "Minimal Path in Network Flow," 1992