

VITA

ALBERT C. REYNOLDS

PROFESSIONAL POSITIONS

McMan Chair in Petroleum Engineering, The University of Tulsa, Tulsa, Oklahoma. 2003–present.

Professor of Petroleum Engineering and Mathematics, The University of Tulsa, Tulsa, Oklahoma. 1985–present.

Chairman, Department of Petroleum Engineering, The University of Tulsa, Tulsa, Oklahoma. 1990–1992

Director of TU Petroleum Reservoir Exploitation Projects, The University of Tulsa, Tulsa, Oklahoma. 1990–present.

Associate Graduate Dean and Associate Director of Research, The University of Tulsa, Tulsa, Oklahoma. 1986–1990.

Associate Professor of Petroleum Engineering and Mathematics, The University of Tulsa, Tulsa, Oklahoma. 1980–1985.

Associate Professor of Mathematics, The University of Tulsa, Tulsa, Oklahoma. 1976–1980.

Assistant Professor of Mathematics, The University of Tulsa, Tulsa, Oklahoma. 1970–1976.

EDUCATION

BA Mathematics University of New Hampshire, Durham, NH, 1964–1966

MS Mathematics Case Institute of Technology, Cleveland, OH, 1966–1968

PhD Mathematics Case Western Reserve University, Cleveland, OH, 1968–1970

PROFESSIONAL MEMBERSHIPS

Society of Petroleum Engineers.

European Association of Geoscientists and Engineers.

International Association of Mathematical Geology.

Society for Industrial and Applied Mathematics.

MAJOR HONORS

Phi Beta Kappa National Honor Society, 1966.

Phi Kappa Phi National Honor Society, 1966.

Society of Petroleum Engineers Distinguished Achievement Award for Petroleum Engineering Faculty, 1983.

Society of Petroleum Engineers Distinguished Member, 1999.

Society of Petroleum Engineers Reservoir Description and Dynamics Award, 2003.

McMan Chair in Petroleum Engineering, 2003

Society of Petroleum Engineers Formation Evaluation Award, 2005.

BOOKS

Numerical Analysis, Prindle, Webber and Schmidt, Inc., Boston, Massachusetts (ix + 579) (with R. Burden and D. Faires) 1978.

Inverse Theory for Petroleum Reservoir Characterization and History Matching, (with D. S. Oliver and Ning Liu), Cambridge University Press, to appear June 2008.

REFEREED TECHNICAL PAPERS

Zhao, Yong and Reynolds, A. C.: "Estimation and Removal of Tidal Effects From Pressure Data," accepted for publication in *SPE Journal*.

Chen, Shi, Li, Gaoming, Peres, Alvaro and Reynolds, A. C.: "A Well Test for In-Situ Determination of Relative-Permeability Curves," paper SPE-96414, to appear in *Reservoir Evaluation & Engineering*, Feb. 2008.

Zhao, Y., Li, G. and Reynolds, A. C.: "Characterization of the Measurement Error in Time-Lapse Seismic Data and Production Data With an EM Algorithm," *Oil & Gas Science and Technology - Revue de l'IFP*, Vol. 62, No. 2 (2007) 181-193.

Zafari, Mohammad and Reynolds, A. C.: "Assessing the Uncertainty in Reservoir Description and Performance Predictions with the Ensemble Kalman Filter," *SPE Journal* (September 2007) 382-391.

Gao, Guohua, Li, Gaoming and Reynolds, A. C.: "A Stochastic Algorithm for Automatic History Matching," *SPE Journal* (June 2007) 196-208.

Boughrara, A. A., Peres, A. M. M., Chen, S., Machado, A. A. V. and Reynolds, A. C.: "Approximate Analytical Solutions for the Pressure Response at a Water Injection Well," *SPE Journal* (March 2007), 19-34.

- Gao, Guohua, Zafari, Mohammad and Reynolds, A. C.: "Quantifying Uncertainty for the PUNQ-S3 Problem in a Bayesian Setting With RML and EnKF," *SPE Journal* (Dec. 2006), 506–515.
- Peres, A. M. M., Boughrara, A. A., and Reynolds, A. C.: "Rate Superposition for Generating Pressure Falloff Solutions for Vertical and Horizontal Wells," *SPE Journal* (Sept. 2006) 364–374.
- Gao, Guohua and Reynolds, A. C.: "An Improved Implementation of the LBFGS Algorithm for Automatic History Matching," paper SPE-90058, *SPE Journal* (March 2006) 5–17.
- Zhang, F., Skjervheim, J. A., Reynolds, A. C. and Oliver, D. S.: "Automatic History Matching in a Bayesian Framework, Example Applications," *SPE Reservoir Evaluation and Engineering* (June 2005) 214-223.
- Reynolds, A. C., Li, R. and Oliver, D. S.: "Estimation of Relative and Absolute Permeability by History Matching of Three-Phase Flow Production Data," *J. Canadian Pet. Tech.* (March, 2004) 37-46.
- Li, R., Reynolds, A. C. and Oliver, D. S.: "History Matching of Three-Phase Production Flow Production Data," *SPE Journal* (Dec. 2003) 328-340.
- Peres, A. M. M. and Reynolds, A. C.: "Theory and Analysis of Injectivity Tests on Horizontal Wells," *SPE Journal*, (June 2003) 147-159.
- Li, R., Reynolds, A. C. and Oliver, D. S.: "Sensitivity Coefficients for Three-Phase Flow History Matching," *J. Canadian Pet. Tech.*, Vol. 42, No. 1 (April 2003) 70-77.
- Zhang, F., Reynolds, A. C. and Oliver, D. S.: "The Impact of Upscaling Errors on Conditioning a Stochastic Channel to Pressure Data," *SPE Journal* (March 2003) 13-21.
- Zhang, F., Reynolds, A. C. and Oliver, D. S.: "Conditioning a Stochastic Channel to Pressure Data: Generation of an Initial Guess for the Levenberg-Marquardt Algorithm," *Mathematical Geology*, Vol. 35, No. 1 (Jan. 2003) 67-88.
- Onur, M. and Reynolds, A. C.: "Nonlinear Regression: the Information Content of Pressure and Pressure Derivative Data," *SPE Journal* Vol. 7, No. 3 (September 2002) 243-249.
- Zhang, F., Reynolds, A. C. and Oliver, D. S.: "Evaluation of the Reduction in Uncertainty Obtained by Conditioning a Stochastic Channel to Multiwell Pressure Data," *Mathematical Geology*, Vol. 34, No. 6 (August 2002) 715-742

- Abacioglu, Y., D. S. Oliver, and A. C. Reynolds, Efficient history-matching using subspace vectors, *Computational Geosciences*, 5, 151–172, 2001.
- Oliver, D. S., A. C. Reynolds, Z. Bi, and Y. Abacioglu, Integration of production data into reservoir models, *Petroleum Geoscience*, 7(SUPP), S65–S73, 2001.
- He, N., D. S. Oliver, and A. C. Reynolds, Conditioning stochastic reservoir models to well-test data, *SPE Reservoir Evaluation & Eng.*, 3(1), 74–79, 2000.
- Bi, Zhuoxin, D. S. Oliver, and A. C. Reynolds, Conditioning 3D stochastic channels to pressure data, *Soc. Petrol. Eng. J.*, 5(4), 474–484, 2000.
- Reynolds, A.C., He, N. and Oliver D.S.: Reducing Uncertainty in Geostatistical Description With Well-Testing Pressure Data, in *Recent Advances in Reservoir Characterization, AAPG Memoir 71*, eds. R. Schatzinger and J. Jordan (1999) 149-162.
- Wu, Z., Reynolds, A. C. and Oliver, D. S.: Conditioning Geostatistical Model to Two-Phase Production Data, *SPE Journal* (June 1999) 142-155.
- Banerjee, R., Thompson, L. G. and Reynolds, A. C.: Injection/Falloff Testing in Heterogeneous Reservoirs, paper SPE 38721, *SPE Reservoir Evaluation & Eng.* (Dec. 1998) 519-527.
- Bonet-Cunha, L., Oliver, D.S., Redner, R.A. and Reynolds, A.C.: Hybrid Markov Chain Monte Carlo Method for Generating Permeability Fields Conditioned to Multiwell Pressure Data and Prior Information, *SPE Journal* (Sept. 1998) 261-271.
- Onur, M. and Reynolds, A.C.: Numerical Laplace Transformation of Sampled Data for Well-Test Analysis, *SPE Reservoir Evaluation & Eng.* (June 1998) 268-276.
- He, N., Reynolds, A. C. and Oliver D. S.: Three-Dimensional Reservoir Description From Multiwell Pressure Data and Prior Information, *SPE Journal* (Sept. 1997) 312-327.
- Thompson, L. G. and Reynolds, A. C.: Pressure Transient Analysis for Gas Condensate Reservoirs, *In Situ*, Vol. 21, No. 2 (1997) 101-144.
- Thompson, L. G. and Reynolds, A. C.: Well Testing for Radially Heterogeneous Reservoirs Under Single and Multiphase Flow Conditions, *SPE Formation Evaluation* (March 1997) 57-64.
- Oliver, D. S., Cunha, L. B. and Reynolds, A. C.: Markov Chain Monte Carlo Methods for Conditioning a Permeability Field to Pressure Data, *Mathematical Geology*, Vol. 29, No. 1 (1997) 61-91.
- Reynolds, A. C., He, N., Chu, L. and Oliver, D. S.: Reparameterization Techniques for Generating Reservoir Descriptions Conditioned to Variograms and Well-Test Pressure Data, *Soc. Pet. Eng. J.* (Dec. 1996) 413-426.
- Carvalo, R., Redner, R. A., Thompson, L. G. and Reynolds, A. C.: Simple Procedures

- for Imposing Constraints for Nonlinear Least Squares Optimization, *Soc. Pet. Eng. J.* (Dec. 1996) 395-402.
- Xiao, J., Fuentes-N., F. Alhanati, F. J., and Reynolds, A. C.: Modeling and Analyzing Pressure Buildup Data Affected by Phase Redistribution in the Wellbore, *SPE Advanced Technology Series*, Vol. 4 (May 1996) 28-37.
- Hatzignatiou, D. G. and Reynolds, A. C.: Determination of Effective or Relative Permeability Curves from Well Tests, paper SPE 20537, *Soc. Pet. Eng. J.* (March 1996) 69-82.
- Chu, L. Reynolds, A. C. and Oliver, D. S.: Computation of Sensitivity Coefficients for Conditioning the Permeability Field to Well-Test Pressure Data, *In Situ*, 19(2), 1995, 179-223.
- Hatzignatiou, D. G., Peres, A. M. M., and Reynolds, A. C.: Effect of Wellbore Storage on the Analysis of Multiphase Flow Pressure Data, *SPE Formation Evaluation* (Sept. 1994) 219-227.
- Hatzignatiou, D. G., Peres, A. M. M., and Reynolds, A. C.: Supplement to SPE 19841, Effect of Wellbore Storage on the Analysis of Multiphase Flow Pressure Data, paper SPE 29096 (Sept. 1994) available from SPE Book Order Department, Richardson, TX.
- Feitosa, G. S., Chu, L., Thompson, L. G., and Reynolds, A. C.: Determination of Permeability Distributions From Well-Test Pressure Data, *Journal Petroleum Technology* (July 1994) 607-615.
- Ding, W. and Reynolds, A. C.: Computation of Pseudoskin Factor for a Restricted-Entry Well, *SPE Formation Evaluation* (March 1994) 9-14.
- Peres, A. M. M., Onur M., and Reynolds, A. C.: A New General Pressure Analysis Procedure for Slug Tests, *SPE Formation Evaluation* (Dec. 1993) 292-298.
- Onur, M., Peres, A. M. M., and Reynolds, A. C.: New Well Testing Pressure Functions With Applications, *SPE Formation Evaluation* (June 1993) 135-144.
- Onur, M., Peres, A. M. M., and Reynolds, A. C.: Supplement to SPE 19514, New Well Testing Pressure Functions with Applications, paper SPE 26214, available from SPE Book Order Dept. (June 1993) Richardson, TX.
- Onur, M., Serra, K. V., and Reynolds, A. C.: Analysis of Pressure Buildup Data Obtained at a Well Located in a Multiwell System, *SPE Formation Evaluation* (March 1991) 101-110.
- Onur, M., Serra, K. V., and Reynolds, A. C.: Supplement to SPE 18123, Analysis of Pressure Buildup Data From a Well in a Multiwell System, paper SPE 22211, available from SPE Book Order Dept., March 1991.

- Peres, A. M. M., Macias-Chapa, L., Serra, K. V., and Reynolds, A. C.: Well-Conditioning Effects on Bubblepoint Pressure of Fluid Samples From Solution-Gas Drive Reservoirs, *SPE Formation Evaluation* (December 1990) 389-398.
- Peres, A. M. M., Macias-Chapa, L. Serra, K. V., and Reynolds, A. C.: Supplement to SPE 18530, Well-Conditioning Effects on Bubblepoint Pressure of Fluid Samples from Solution-Gas Drive Reservoirs, paper SPE 21478, available from SPE Book Order Dept., December 1990.
- Peres, A. M. M., Serra, K. V., and Reynolds, A. C.: Towards a Unified Theory of Well Testing for Nonlinear Radial Flow Problems, *SPE Formation Evaluation* (June 1990) 151-160.
- Peres, A. M. M., Serra, K. V., and Reynolds, A. C.: Supplement to Towards a Unified Theory of Well Testing for Nonlinear-Radial-Flow Problems with Application to Interference Tests, paper SPE 20402, available from the SPE Book Order Department (June 1990).
- Ding, W., Onur, M., and Reynolds, A. C.: Analysis of Gas Well Late-Time Pressure and Rate Data, *Journal of Petroleum Science and Engineering*, 4 (1990) 293-307.
- Serra, K. V., Peres, A. M. M., and Reynolds, A. C.: Well Test Analysis for Solution-Gas Drive Reservoirs - Part I: Determination of Relative and Absolute Permeabilities, *SPE Formation Evaluation* (June 1990) 124-132.
- Serra, K. V., Peres, A. M. M., and Reynolds, A. C.: Well Test Analysis for Solution-Gas Drive Reservoirs - Part II: Buildup Analysis, *SPE Formation Evaluation* (June 1990) 133-140.
- Serra, K. V., Peres, A. M. M., and Reynolds, A. C.: Supplement to Well Test Analysis for Solution-Gas-Drive Reservoirs: Part II - Buildup Analysis, paper SPE 20376, available from the SPE Book Order Department (June 1990).
- Serra, K. V., Peres, A. M. M., and Reynolds, A. C.: Well Test Analysis for Solution-Gas Drive Reservoirs - Part III: A Unified Treatment of the Pressure Squared Method, *SPE Formation Evaluation* (June 1990) 141-150.
- Serra, K. V., Peres, A. M. M., and Reynolds, A. C.: Supplement to Well Test Analysis for Solution-Gas-Drive Reservoirs: Part III - A Unified Treatment of the Pressure Squared Method. paper SPE 20309, available from the SPE Book Order Department (June 1990).
- Onur, M. and Reynolds, A. C.: Interference Testing of a Two-Layer Commingled Reservoirs, *SPE Formation Evaluation* (December 1989) 595-603.
- Onur, M. and Reynolds, A. C.: SPE 20016 Supplement to SPE 15132, Interference Testing of a Two-Layer Commingled Reservoir, (December 1989) available from

SPE Book Order Department.

- Onur, M., Yeh, N., and Reynolds, A. C.: New Applications of the Pressure Derivative in Well Test Analysis, *SPE Formation Evaluation* (September 1989) 429-437.
- Peres, A. M. M., Onur, M., and Reynolds, A. C.: A New Analysis Procedure for Determining Aquifer Properties From Slug Test Data, *Water Resources Research* (July 1989) 1591-1602.
- Yeh, N. and Reynolds, A. C.: Computation of the Pseudoskin Factor Caused by a Restricted-Entry Well Completed in a Multilayer Reservoir, *SPE Formation Evaluation*, (June 1989) 253-263.
- Yeh, N. and Reynolds, A. C.: Supplement to SPE 15793, Computation of the Pseudoskin Factor Caused by a Restricted-Entry Well Completed in a Multilayer Reservoir, paper SPE 19515, available from SPE Book Order Department (June 1989).
- Yeh, N. and Reynolds, A. C.: Analysis of Pressure Data from a Restricted-Entry Well in a Multilayered Reservoir, *SPE Formation Evaluation*, (March 1989) 81-89.
- Onur, M. and Reynolds, A. C.: A New Approach for Constructing Derivative Type Curves for Well Test Analysis, *SPE Formation Evaluation* (March 1989) 81-89.
- Reynolds, A. C., Bratvold, R., and Ding, W.: Semilog Analysis of Gas Well Drawdown and Buildup Data, *SPE Formation Evaluation* (December 1987) 657-670.
- Camacho-V, R., Raghavan, R., and Reynolds, A. C.: Response of Well Producing Layers Reservoirs: Unequal Fracture Length, *SPE Formation Evaluation*, (March 1987) 9-28.
- Thompson, L. G. and Reynolds, A. C.: Analysis of Variable-Rate Well Test Pressure Data Using Duhamel's Principle, *SPE Formation Evaluation* (October 1986) 453-469.
- Thompson, L. G., Jones, J., and Reynolds, A. C.: Analysis of Pressure Buildup Data Influenced by Wellbore Phase Redistribution Effects, *SPE Formation Evaluation* (October 1986) 435-452.
- Chu, W. C., Reynolds, A. C., and Raghavan, R.: Pressure Transient Analysis of Two-Phase Flow Problems, *SPE Formation Evaluation* (April 1986) 151-164.
- Bennett, C. O., Raghavan, R., and Reynolds, A. C.: Analysis of Finite-Conductivity Fractures Intercepting Multilayer Reservoirs, *SPE Formation Evaluation* (June 1986) 259-274.
- Bennett, C. O., Reynolds, A. C., Raghavan, R., and Elbel, J.: Performance of Finite Conductivity Vertically Fractured Wells in Single-Layer Reservoirs, *SPE Formation Evaluation* (August 1986) 399-412.
- Bennett, C. O., Camacho-V, R., Reynolds, A. C., and Raghavan, R.: Approximate

- Solutions for Fractured Wells Producing Layered Reservoirs, *Society of Petroleum Engineers Journal* (October 1985) 729-742.
- Chen, C. C., Serra, K. V., Reynolds, A. C., and Raghavan, R.: Pressure Transient Analysis Methods for Bounded Naturally Fractured Reservoirs, *Society of Petroleum Engineers Journal* (June 1985) 451-464.
- Prijambodo, R., Raghavan, R., and Reynolds, A. C.: Well Test Analysis for Wells Producing Layered Reservoirs with Crossflow, *Society of Petroleum Engineers Journal* (June 1985) 451-464.
- Reynolds, A. C., Chang W. L., Yeh, N., and Raghavan, R.: The Wellbore Pressure Response in Naturally Fractured Reservoirs, *Journal of Petroleum Technology* (May 1985) 908-920.
- Chen, C. C., Yeh, N., Raghavan, R., and Reynolds, A. C.: Pressure Response at Observation Wells in Fractured Reservoirs, *Society of Petroleum Engineers Journal* (December 1984) 628-638.
- Reynolds, A. C., Chen, J. C., and Raghavan, R.: Pseudoskin Factor Due to Partial Penetration, *Journal of Petroleum Technology* (December 1984) 2197-2210.
- Chu, W. C., Reynolds, A. C., and Raghavan, R.: On the Analysis of Well Test Data Influenced by Wellbore Storage, Skin and Bottom Water Drive, *Journal of Petroleum Technology* (November 1984) 1991-2001.
- Serra, K. V., Reynolds, A. C., and Raghavan, R.: New Pressure Transient Analysis Methods for Naturally Fractured Reservoirs, *Journal of Petroleum Technology* (December 1983) 2271-2283.
- Bennett, C. O., Rosato, N. D., Reynolds, A. C., and Raghavan, R.: Influence of Fracture Heterogeneity and Wing Length on the Response of Vertically Fractured Wells, *Society of Petroleum Engineers Journal* (April 1983) 219-230.
- Rosato, D. N., Bennett, C. O., Reynolds, A. C., and Raghavan, R.: Analysis of Short-Time Buildup Data for Finite-Conductivity Fractures, *Journal of Petroleum Technology* (October 1982) 2413-2422.
- Raghavan, R., Reynolds, A. C., and Meng, H.: Analysis of Pressure Buildup Data Following a Short Flow Period, *Journal of Petroleum Technology* (April 1982) 904-916.
- Bennett, C. O., Reynolds, A. C., and Raghavan, R.: Analysis of Pressure Data From Vertically Fractured Injection Wells, *Society of Petroleum Engineers Journal* (February 1981) 5-19.
- Reynolds, A. C.: Boundary Conditions for the Numerical Solution of Wave Propagation Problems, *Geophysics*, 23 (1978) 1099-1110.

- Thomas, G. W., Keys, R. G., and Reynolds, A. C.: The Computation of Leaky Aquifer Functions, *Journal of Hydrology*, 36 (1978) 173-178.
- Reynolds, A. C.: On a Crank-Nicolson Scheme for Nonlinear Parabolic Equations, *Rocky Mountain Journal of Mathematics*, The Rocky Mountain Consortium, 5 (1975) 611-622.
- Reynolds, A. C.: Asymptotic Behavior of Solutions of Nonlinear Parabolic Equations, *Journal of Differential Equations*, 12 (1972) 256-261.
- Reynolds, A. C.: Convergent Finite Difference Schemes for Nonlinear Parabolic Equations, *SIAM Journal of Numerical Analysis*, 9 (1972) 522-532.

Proceedings Publications NOT published as Journal Articles

- Thulin, K., Li, G., Aanonsen, S. I. and Reynolds, A. C.: "Estimation of Initial Fluid Contacts by Assimilation of Production Data With EnKF, SPE-109975, Proceedings of the 2007 SPE Annual Technical Conference and Exhibition, Nov. 2007.
- Li, G. and Reynolds, A. C.: "An Iterative Ensemble Kalman Filter for Data Assimilation, SPE-109808, Proceedings of the 2007 SPE Annual Technical Conference and Exhibition, Nov. 2007.
- Wang, C., Li, G. and Reynolds, A. C.: "Production Optimization in the Context of Closed-Loop Reservoir Management," SPE-109805, Proceedings of the 2007 SPE Annual Technical Conference and Exhibition, Nov. 2007.
- Bougrara, A. A. and Reynolds, A. C.: "Practical Analysis of Injection/Falloff Data From Horizontal Wells," SPE-109799, Proceedings of the 2007 SPE Annual Technical Conference and Exhibition, Nov. 2007.
- Wang, C., Li, G. and Reynolds, A. C.: "Optimal Well Placement for Production Optimization," SPE-111154, Proceeding of the 2007 SPE Eastern Regional Meeting, Oct. 2007.
- Eyidinov D., Gao, G., Li, G. and Reynolds, A. C.: "Simultaneous Estimation of Relative Permeability Curves and Porosity/Permeability Fields by History Matching Production Data," Paper 2007-143, Proceeding of the 2007 Canadian International Petroleum Conference, June 2007.
- Reynolds, A. C., Zafari, M. and Li, G.: Iterative Forms of the Ensemble Kalman Filter, *Proceedings 10th European Conference on the Mathematics of Oil Recovery*, Amsterdam, Sept. 2006.
- Zhao, Y., Li, G. and Reynolds A. C.: Characterizing Data Measurement Errors with the EM Algorithm, *Proceedings 10th European Conference on the Mathematics of Oil Recovery*, Amsterdam, Sept. 2006.

- Reynolds, A. C., Zafari, Mohammad, and Li, Gaoming: "The Ensemble Kalman Filter and SPSA," SIAM Geoscience Conference (June 2005) Avignon (presentation, only abstract published).
- Gao, Guohua, Zafari, Mohammad and Reynolds, A. C.: "The Tengiz Field History Matching Problem Revisited," paper SPE-90896, Proceedings of the 2004 SPE Annual Technical Conference and Exhibition, Sept. 2004, Houston.
- Zhang, F., Skjervheim, J. A. and Reynolds, A. C.: "An Automatic History Matching Example," Proceedings of the EAGE 65th Conf. and Exhib., Stavanger Norway, June 2003.
- Zhang, F. and A. C. Reynolds, Optimization algorithms for automatic history matching of production data, *Proceedings 8th European Conference on the Mathematics of Oil Recovery*, Sept. 2002.
- Abacioglu, Y., Reynolds, A. C. and Oliver, D. S.: Estimating Heterogeneous Anisotropic Permeability Fields From Multiwell Interference Tests: A Field Example, paper SPE 38654, Proceedings of the 1997 SPE Annual Technical Conference and Exhibition, San Antonio, Oct. 5-8.
- Oliver, D. S., He, N. and Reynolds, A. C.: Conditioning Permeability Fields to Pressure Data, *Proceedings of the 5th European Conference on the Mathematics of Oil Recovery*, Leoben, Sept. 3-6, 1996.
- Chu, L., Reynolds, A. C. and Oliver, D. S.: Reservoir Description From Static and Well-Test Data Using Efficient Gradient Methods, paper SPE 29999, Proceedings of 1995 SPE International Meeting in Beijing.
- He, N. and Reynolds, A. C.: Estimation of Porosity in Thin-Layered Reservoirs by Seismic Inversion, (Extended Abstract) Proceedings of 1995 SEG Annual Meeting, Oct. 8-13, 1022-1024.
- Chu, L., Reynolds, A. C. and Oliver, D. S.: Computation of Sensitivity Coefficients With Application to the Integration of Static and Well-Test Data, Proceedings of the Eclipse International Forum, Milano, Sept. 6-9, 1994.
- Feitosa, G. S., Chu, L., Thompson, L. G., and Reynolds, A. C.: Determination of Reservoir Permeability Distribution From Pressure Buildup Data, paper SPE 26047, Proceedings of the 1993 SPE Annual Technical Conference and Exhibition, Houston, Texas, October 3-6, 1993.
- Chu, L. and Reynolds, A. C.: Analysis of Pressure Data From Heterogeneous Reservoirs: Wellbore Storage and Skin Effects, paper SPE 26047, Proceedings of the 1994 Western Regional Meeting, Long Beach, CA March 23-25.
- Roadifer, R. D. and Reynolds, A. C.: Estimation of the Pseudoskin Factor Caused

- by a Restricted-Entry Well Under Multiphase Flow Conditions, paper SPE 26052, Proceedings of the 1993 Western Regional Meeting, Anchorage, Alaska, May 26-28, 1993.
- Xiao, J. J. and Reynolds, A. C.: A Pseudopressure-Pseudotime Transformation for the Analysis of Gas Well Closed Chamber Tests, paper SPE 25879, Proceedings of the 1993 SPE Rocky Mountain Regional/Low Permeability Meeting, Denver, CO, April 12-14, 1993.
- Onur, M., Satman, A., and Reynolds, A. C.: New Type Curves for Analyzing the Transition Time Data From Naturally Fractured Reservoirs, paper SPE 25873, Proceedings of the 1993 SPE Rocky Mountain Regional/Low Permeability Meeting, Denver, CO, April 12-14, 1993.
- Thompson, L. G., Niu, J. G., and Reynolds, A. C.: Well Testing for Gas Condensate Reservoirs, paper SPE 25371, Proceedings of the 1993 SPE Asia Pacific Oil & Gas Conference and Exhibition, Singapore, Feb. 8-10, 1993.
- Carvalho, R. S., Redner, R. A., Thompson, L. G., and Reynolds, A. C.: Robust Procedures for Parameter Estimation by Automated Type-Curve Matching, paper SPE 24732, Proceedings of 1992 SPE Annual Technical Conference and Exhibition, Washington, D.C., October 4-7, 1992.
- Hatzignatiou, D. G. and Reynolds, A. C.: Estimation of Effective Permeabilities for Heterogeneous Reservoirs, paper SPE 24061, Proceedings of the 1992 SPE Western Regional Meeting, Bakersfield, March 30-April 1, 1993.
- Xiao, J. and Reynolds, A. C.: New Methods for the Analysis of Closed Chamber Tests, paper SPE 24059 Proceedings of the 1992 SPE Western Regional Meeting, Bakersfield, March 30-April 1, 1993.
- Guehria, F. M., Thompson, L. G., and Reynolds, A. C.: A Robust Algorithm for Determining Hydrocarbon PVT Properties Using a Generalized EOS, Proceedings of the Petroleum Society of CIM/SPE International Technical Meeting, June 10-13, 1990, Calgary.
- Peres, A. M. M., Onur, M., and Reynolds, A. C.: New Methods for the Analysis of Drillstem Test Data, paper SPE 19843, Proceedings of the 1989 SPE Annual Fall Meeting, San Antonio, Oct. 8-11, 1991.
- Ding, W., Onur, M., and Reynolds, A. C.: Analysis of Well-Testing Data from a Restricted-Entry Well, paper SPE 18877, Proceedings of the 1989 SPE Production Operations Symposium, Oklahoma City, OK.
- Iskander, R., McKinley, J., and Reynolds, A. C.: Minimizing Feedback Gains in Multi-Input, Multi-Output Systems, Proceedings of the 18th Midwest Symposium on Cir-

cuits and Systems, (1979) 640-644.

Verma, V., Reynolds, A. C., and Thomas, G. W.: A Theoretical Investigation of Forward Combustion in a One-Dimensional System, paper SPE 7526, 1978 SPE Annual Fall Meeting.

Bangia, V., Bennett, C. O., Reynolds, A. C., Raghavan, R., and Thomas, G. W.: Alternating Direction Collocation Methods for Simulating Reservoir Performance, paper SPE 7414, 1978 SPE Annual Fall Meeting.

Keys, R. G. and Reynolds, A. C.: On the Solution of Linear Parabolic Problems by Boundary Value Techniques, *Proceedings of the AICA International Symposium on Computer Methods for Partial Differential Equations* , (1975) 86-89.

RECENT RESEARCH FUNDING

“University of Tulsa Petroleum Reservoir Exploitation Projects,” funded by oil industry firms, 2002–2007 funding: \$880,000.

Mapping of Reservoir Properties and Facies by Automatic History Matching; U.S. DOE, \$577,000, 2000–2003.

“Data Integration for the Generation of High Resolution Reservoir Models,” U.S. Dept. of Energy, 2004–2008, \$797,000.

“Data Assimilation with the Ensemble Kalman Filter,” Chevron Energy Technology Company, \$190,000, 2007–2009.

SPE PROFESSIONAL SERVICE ACTIVITIES

Co-Chair of Steering Committee for SPE ATW “Closed-Loop Reservoir Management,” Bruges, Belgium, June 2008.

Member of Program Committee for 2009 SPE Reservoir Simulation Symposium.

Member of SPE Formation Evaluation Committee, 2007–present.

Technical Editor for *SPE Reservoir Evaluation and Engineering*, 2007–present.

Member of Steering Committee for SPE ATW, “History Matching: New Developments and Best Practices,” Co-Chaired Session: “Assisted History Matching/Inverse Modeling,” Houston, Oct. 2006.

Technical Session Co-Chairman: New Techniques in Data Measurement and Analysis, 2006 SPE ATCE, Sept. 2006.

Program Committee Chair, 2006 SPE Improved Oil Recovery Symposium.

SPE Reservoir Monitoring Committee, member 2004–present.

Technical Session Co-Chairman: Innovations in Reservoir Monitoring and Mapping of Flow, 2005 SPE ATCE.

Program Committee Chair for 2006 SPE Improved Oil Recovery Symposium.

Invited Presentation: “Automatic History Matching, SPE Bartlesville Section, May 2003.

Invited Presentation: “Conditioning Stochastic Channels to Pressure Data, SPE Applied Technology Workshop, History Matching, Applied Techniques, Feb. 28–March 3, 2000, University of Cambridge.

Invited Presentation and Discussion Leader: Conditioning Reservoir Models to Production Data, SPE Forum: Impact of Pore-Scale to Well-Test-Scale Data Relationships, July 12-17, 1998, Breckinridge, CO.

Member SPE Formation Evaluation Award Committee, Oct. 1996-1999, (Chairman, 1999).

SPE Technical Editor: May 1983-June 1985, June 1989-October 1992.

Invited Lecture: Analysis of Radial Flow Pressure Data From Heterogeneous Multiphase Flow Systems, presented at the Pressure Transient Well Testing Seminar of the Reservoir Engineering Study Group of the Dallas SPE Section, June 1994.

Member of SPE Program Committee, for Annual Technical Conference and Exhibition 1993-94.

Member of SPE Pressure Transient Testing Technical Committee, October 1991- October 1994, Chairman 1993-94.

Member of SPE Well Testing Monograph Group for review of Bourdet/Gringarten Monograph on Well Testing, 1993 - present.

Technical Session Co-Chairman, Integration of Geoscience and Well Testing, 1994 SPE Annual Technical Conference and Exhibition.

Technical Session Co-Chairman, Well Testing Application and Models, 1993 SPE Annual Technical Conference and Exhibition.

Judge for B.S. Division of 1993 SPE International Student Paper Contest, Houston, Texas, October 3-6.

Judge for Ph.D. Division of 1993 SPE Western Regional Student Paper Contest, Anchorage, AK, May 26-28.

Moderator for Ph.D. Division of 1993 SPE Rocky Mountain/Mid-Continent Regional Student Paper Contest, Tulsa, OK.

Advances in Well Testing, two day course taught by invitation of the Brazilian Section of SPE, Rio de Janeiro, Sept. 1989.

Technical Session Co-Chairman, Testing of Fractured Wells and Reservoirs, 1992 SPE Annual Technical Conference and Exhibition.

Member of SPE Well Testing Committee for the Selection of Papers to be presented at the SPE Annual Fall Meeting, 1981,1982.

Discussion Leader, SPE Continuing Education Course, Pressure Drawdown and Buildup Analysis, May 1984.

Technical Session Co-Chairman: Analysis of Fractured Systems, 1981 SPE Annual Fall Meeting

Has personally presented 30 papers at SPE meetings from 1981-present and has co-authored over 30 other papers presented at SPE meetings.

OTHER PROFESSIONAL SERVICE AND INVITED TALKS

Invited Talk: “EnKF for Data Assimilation and Closed-Loop Reservoir Management,” Louisiana State University, Oct. 2007.

Invited Talk: EnKF for Nonlinear Non-Gaussian Problems, Workshop on the Ensemble Kalman Filter sponsored by CIPR and IRIS, Bergen, Norway, June, 2007.

Invited Talk: The Ensemble Kalman Filter for Data Assimilation and Closed-Loop Reservoir Management, ConocoPhillips, June 2007.

Invited Talk: “Combining the Ensemble Kalman Filter with the Gauss-Newton Method,” Workshop on the Ensemble Kalman Filter sponsored by CIPR and IRIS, Voss, Norway, June, 2006

Invited Talk: “The Ensemble Kalman Filter for the Continuous Updating of Reservoir Models: Theoretical Remarks and Computational Experiments,” Chevron, San Ramon, March 2006.

AIME Rossiter Raymond Memorial Award Committee, Member 1991, Chairman 1992. (The award recognizes the best paper published in a journal of one of the four AIME professional societies and written by a member under 33 years of age.)

Chaired session on Inverse Methods and Discretization, European Conference on the Mathematics of Oil Recovery, Freiberg, Germany, Sept. 2002.

Invited Talk: TUPREP Research on Pressure Transient Analysis and Automatic History Matching, University of Bergen, June 2003.

Invited Talk: Injection/Falloff Testing, Stavanger University, June 2003.

Invited Talk: Automatic History Matching of Production Data, Conference on Integrated Reservoir Characterisation and Modeling, sponsored by IQPC, 23-24 July 2002, London (talk presented by co-author, Fengjun Zhang).

Invited Tutorial Lecture: Automatic History Matching, University of Southern California, April 2002.

Invited Seminar: Well Testing under Multiphase Flow Conditions, U. of Southern California, April 2002.

- Invited Lecture: New Results in Automatic History Matching and Well Test Analysis, BP, June 2001.
- Invited Presentation: Conditioning Geostatistical Models to Production Data by Automatic History Matching, SIAM Geoscience Conference, March 24-27, 1999, San Antonio.
- Invited Lecture: Applications of Inverse Problem Theory to Reservoir Characterization, Mobil Technology Company, Dec. 1997.
- Invited Lecture: Analysis of Well-Test Pressure From Gas Condensate Reservoirs, presented at Mobil Exploration and Producing Technology Center, March 1994.
- Invited Lecture: New Theory for Drawdown and Buildup Testing of Gas Condensate Reservoirs, presented at Mobil Exploration and Producing Technical Center, Oct. 21, 1994.
- Invited Lecture: Application of Inverse Problem Theory to the Determination of Reservoir Description, presented at Mobil Exploration and Producing Technical Center, Oct. 21, 1994.
- Invited Lecture: Analysis of Pressure Data Conditioned to Spatial Statistics, presented at Statoil-Saga-Norsk Hydro workshop on The Use of Well Test Information in Stochastic Modeling, Oslo, Sept. 5-6, 1994.
- Invited Lecture: Pressure Transient Analysis for Heterogeneous Systems, BDM Seminar Series, July 1994.
- Invited Lecture: Computation of Sensitivity Coefficients With Applications to the Integration of Static and Well-Test Pressure Data, presented at the Eclipse International Forum, Milan, Sept. 6-10, 1994.
- Invited Lecture: Well Testing for Heterogeneous Reservoirs, presented at Pennsylvania State University, Petroleum Engineering and Natural Gas Section, Oct. 28, 1993
- Invited Lecture: New Techniques for the Analysis of Slug and Drillstem Test Data, presented at University of Texas at Austin, Department of Petroleum Engineering, Nov. 19, 1990.
- Invited Lecture: Analysis of Well Test Data Under Multiphase Flow Conditions, presented at the University of Campinas and at the Petrobras Research Center, September 1989.
- Invited Lecture: New Derivative Type Curves for Well Test Analysis, presented at the University of Oklahoma, Department of Petroleum Engineering, March 1987.

Invited Lecture: Analytical and Approximate Analytical Solutions of Initial-Boundary-Value Problems of Interest in Well Testing, 1986 Texas-Oklahoma SIAM Sectional Meeting, Feb. 1986.

Invited Lecture: Well Testing Research Methodology, SOHIO Distinguished Speaker Series, Jan. 1984.

UNIVERSITY OF TULSA, UNIVERSITY AND COLLEGE SERVICE ACTIVITIES

Faculty Senate, 2004-2006.

Faculty Affairs Committee of Faculty Senate, 2004-2006.

Activities for Tulsa Chapter of Phi Beta Kappa Historian, 1988-1990 Member Executive Committee, 1988-1991. Audit Committee, 1992-94. New Member Selection Committee: 2001, 2002, 2003.

Member of University of Tulsa Graduate Council, 1980-1982, 1985-1986, 2001-2003.

Member of University of Tulsa College Committee on Rank and Continuing Appointments, 1977-1979, 1982-1984, 1985-1988, 1990-1994.

Associate Dean of the Graduate School and Associate Director of Research, September 1986-1990

Presidents Blue Ribbon Committee for Program Review, University of Tulsa, 1990-91.

University of Tulsa Representative to Geoscience Institute for Oil and Gas Recovery Research, 1988-1993.

University of Tulsa representative for National Center for Supercomputing Applications University Affiliates Program, 1987-1989.

Awards Selection Committee for the Outstanding Junior Researcher Award, College of Engineering and Applied Sciences, University of Tulsa, 1992.

Member of the Subcommittee of the University of Tulsa Graduate Council for the Selection of Doctoral Faculty, 1980-1982, 1985.

Appeals Committee of the University of Tulsa Graduate Council, 1977-1980.

University Library Committee, 1972-1975.

University Traffic Policies Committee, 1972-1976.

Untenured Faculty Representative to the Engineering College Tenure Committee, 1974.

Engineering College Library Committee, 1974-1979.

UNIVERSITY OF TULSA, DEPARTMENT SERVICE ACTIVITIES

Directed the research of 24 Ph.D. students and 23 Masters students. Have served on the Research Advisory Committee for 61 other graduate students. Currently supervise 6 PhD and 1 M.S. students working on funded research projects.

Petroleum Engineering Department Chairman, 1990-1992.

Graduate Program Coordinator (Advisor) , 1985, 1995-2004.

Chairman of Petroleum Engineering Department Review Committee for the following people: L. G. Thompson (1992), O. Shoham (1993), Z. Schmidt (1993).

Coordinator for Petroleum Engineering Department Graduate Seminar, Spring 1992, Spring 1994, Fall 2006.

Petroleum Engineering Department Graduate Committee, Chairman, 1991 - 1994.

Chairman of Petroleum Engineering Department Committee for Developing Policies and Procedures Governing Research Associates, 1994.

Chairman of Petroleum Engineering Department Self-Study Committee related to 1998 Graduate School internal review of petroleum engineering graduate programs.

Member Search Committee for Drilling Engineering Faculty Member, 2001-2002.

Member Search Committee for Petroleum Engineering Department Chairman, 2001-2002.

Member Search Committee for Petroleum Engineering Faculty Members, 2002-2003.

Member of Committee for Developing Ph.D. Program in Computer Science, 1987.

Mathematics Curriculum Committee, 1973-1980.

Faculty Sponsor of the University of Tulsa Mathematics Club, 1973-1977.

Lectures to Tulsa High School Math Clubs, 1971-1978.