

## Zuleima T. Karpyn, Ph.D.

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### EDUCATION

- 9/01 - 5/05      **Ph.D., Petroleum and Natural Gas Engineering**, The Pennsylvania State University.
- 1/99 - 5/01      **M.S., Petroleum and Natural Gas Engineering**, The Pennsylvania State University.
- 9/91 - 8/97      **B.S., Chemical Engineering**, Universidad Central de Venezuela.

### HONORS AND AWARDS

- Fulbright U.S. Scholar Award, Fulbright – Colciencias Innovation and Technology, 2016-2017.
- Foundation CMG Chair in Fluid Behavior and Rock Interactions, 2014.
- George H. Deike, Jr. Research Grant, The Pennsylvania State University, 2011.
- Quentin E. and Louise L. Wood Endowed Faculty Fellow in Petroleum and Natural Gas Engineering, The Pennsylvania State University, 2010.
- Wilson Award for Excellence in Teaching, The Pennsylvania State University, 2010.
- Faculty Early Career Development (CAREER) Award, National Science Foundation, 2008.
- Outstanding Service to the American Association of Petroleum Geologists - Eastern Section, as Technical Program Co-Chair of the AAPG-SPE 2008 Eastern Meeting, Pittsburgh, Pennsylvania, 2008.
- Wilson Research Initiation Grant, The Pennsylvania State University, 2005.
- Student awards: 2<sup>nd</sup> place at 2003 Penn State Annual Graduate Exhibition - Engineering division; 1<sup>st</sup> place at 2001 International SPE Student Paper Contest - Master's division; 1<sup>st</sup> place at 2001 Rocky Mountain Regional SPE Student Paper Contest - Master's division; 3<sup>rd</sup> place at 2001 Penn State Annual Graduate Exhibition - Engineering Division; 1999-2000 Fundación Gran Mariscal de Ayacucho Scholarship, Venezuela; 1991-1996 Talent Award Scholarship, Fundación Gran Mariscal de Ayacucho, Venezuela.

### PROFESSIONAL EXPERIENCE

- 7/16 – present      **Professor of Petroleum and Natural Gas Engineering**, John and Willie Leone Family Department of Energy and Mineral Engineering, The Pennsylvania State University.
- 8/11 – 6/16      **Associate Professor of Petroleum and Natural Gas Engineering**, John and Willie Leone Family Department of Energy and Mineral Engineering, The Pennsylvania State University.
- 7/13 – 6/14      **Interim Director of the EMS Energy Institute**, The Pennsylvania State University.
- 1/05 – 7/11      **Assistant Professor of Petroleum and Natural Gas Engineering**, John and Willie Leone Family Department of Energy and Mineral Engineering (former Department of Energy and Geo-Environmental Engineering), The Pennsylvania State University.
- 8/03 - 12/04      **Instructor of Petroleum and Natural Gas Engineering**, Department of Energy and Geo-Environmental Engineering, The Pennsylvania State University.

- 9/01 - 7/03      **Research Assistant**, Department of Energy and Geo-Environmental Engineering, The Pennsylvania State University.
- 6/01 – 8/01      **Summer Intern**, Holditch-Reservoir Technologies, Schlumberger, Houston, Texas.

## ARTICLES PUBLISHED IN REFEREED JOURNALS

### *Published and accepted*

- 1) Klise, K., Moriarty, D., Yoon, H., and **Karpyn, Z.T.**, (*in press 2015*). "Automated contact angle estimation for three-dimensional X-ray microtomography data". *Advances in Water Resources*, in press, DOI: 10.1016/j.advwatres.2015.11.006.
- 2) Brunet, J.-P., Li, L., **Karpyn, Z.T.**, Huerta, N., 2016. "Fracture opening and self-healing: critical residence time as a unifying parameter for diverging cement fracture property evolution under carbon sequestration conditions". *International Journal of Greenhouse Gas Control*, 47 (April): 25-37. DOI: 10.1016/j.ijggc.2016.01.024.
- 3) Cao, P., **Karpyn, Z.T.**, and Li, L., 2016. "The role of host rock properties in determining potential CO<sub>2</sub> leakage pathways". *International Journal of Greenhouse Gas Control*, 45 (February): 18-26. DOI: 10.1016/j.ijggc.2015.12.002.
- 4) Torrealba, V. A., **Karpyn, Z. T.**, Yoon, H., Klise, K. A., and Crandall, D., 2016. "Pore-scale investigation on stress-dependent characteristics of granular packs and their impact on fluid distribution". *Geofluids*, 16(1): 198-207. DOI: 10.1111/gfl.12143.
- 5) Cao, P., **Karpyn, Z.T.**, and Li, L., 2015. "Self-healing of cement fractures under dynamic flow of CO<sub>2</sub>-rich brine". *Water Resources Research*, 51(6): 4684-4701. DOI: 10.1002/2014WR016162.
- 6) Aksu, I., Bazilevskaya, K., and **Karpyn, Z.T.**, 2015. "Swelling of clay minerals in unconsolidated porous media and its impact on permeability". *GeoResJ*, 7(September): 1-13. DOI:10.1016/j.grj.2015.02.003.
- 7) Alexis, D., **Karpyn, Z.T.**, Ertekin, T., and Crandall, D., 2015. "Fracture permeability and relative permeability of coal and their dependence on stress conditions". *Journal of Unconventional Oil and Gas Resources*, 10(June): 1-10. DOI:10.1016/j.juogr.2015.02.001.
- 8) Yan, Q., Lemanski, C., **Karpyn, Z.T.**, and Ayala H., L.F., 2015. "Experimental investigation of shale gas production impairment due to fracturing fluid migration during shut-in time". *Journal of Natural Gas Science & Engineering*, 24(May): 99-105. DOI:10.1016/j.jngse.2015.03.017.
- 9) Li, X., Akbarabadi, M., **Karpyn, Z.T.**, Piri, M. and Bazilevskaya, E., 2015. "Experimental investigation of carbon dioxide trapping due to capillary retention in saline aquifers". *Geofluids*, 15(1-2): 1-14. DOI: 10.1111/gfl.12127.
- 10) Thararoop, P., **Karpyn, Z.T.**, and Ertekin, T., 2015. "A production type-curve solution for coalbed methane reservoirs". *Journal of Unconventional Oil and Gas Resources*, 9(March): 136-152. DOI:10.1016/j.juogr.2014.12.001.
- 11) Thararoop, P., **Karpyn, Z.T.**, and Ertekin, T., 2015. "Development of Material Balance Equation for Coalbed Methane Reservoirs Accounting for the Presence of Water in the Coal Matrix and Coal Shrinkage and Swelling". *Journal of Unconventional Oil and Gas Resources*, 9(March): 153-162. DOI:10.1016/j.juogr.2014.12.002.

- 12) Ghazanfari, E., Pamukcu, S., Pervizpour, M., and **Karpyn, Z.T.**, 2014. "Investigation of generalized relative permeability coefficients for electrically assisted oil recovery in oil formations". *Transport in Porous Media*, 105(1): 235-253. DOI: 10.1007/s11242-014-0368-6.
- 13) Landry, C. J., **Karpyn, Z.T.**, and Ayala, O.M., 2014. "Relative permeability of homogeneous-wet and mix-wet porous media as determined by pore-scale Lattice Boltzmann modeling". *Water Resources Research*, 50(5): 3672-3689. DOI:10.1002/2013WR015148.
- 14) Landry, C. J., **Karpyn, Z.T.**, and Ayala, O.M., 2014. "Pore-scale lattice Boltzmann modeling and 4D x-ray computed microtomography imaging of fracture-matrix fluid transfer". *Transport in Porous Media*, 103 (3): 449-468. DOI:10.1007/s11242-014-0311-x.
- 15) Odumabo, S., **Karpyn, Z.T.**, and Ayala H., L.F., 2014. "Investigation of gas flow hindrance due to fracturing fluid leak off in low permeability formations". *Journal of Natural Gas Science and Engineering*, 17(3): 1-12. DOI:10.1016/j.jngse.2013.12.002.
- 16) Dutta, R., Lee, C.-H., Odumabo, S., Ye, P., Walker, S.C., **Karpyn, Z.T.**, and Ayala H., L.F., 2014. "Experimental investigation of fracturing-fluid migration due to spontaneous imbibition in fractured low-permeability sands". *SPE Reservoir Evaluation & Engineering*, 17(1): 74-81. DOI:10.2118/154939-PA.
- 17) Celauro, J.G., Torrealba, V.A., **Karpyn, Z.T.**, Klise, K.A., and McKenna, S.A., 2014. "Pore-scale multiphase flow experiments in bead packs of variable wettability". *Geofluids*, 14(1): 95-105. DOI: 10.1111/gfl.12045.
- 18) Brunet, J.-P., Li, L., **Karpyn, Z.T.**, Kutchko, B.G., Strazisar, B., and Bromhal, G., 2013. "Dynamic evolution of cement composition and transport properties under conditions relevant to geological carbon sequestration". *Energy and Fuels*, 27(8): 4208-4220. DOI: 10.1021/ef302023v.
- 19) Larpudomlert, R., Torrealba, V., **Karpyn, Z.T.**, and Halleck, P.M., 2013. "Experimental investigation of residual saturation in mixed-wet porous media using a pore-scale approach". *Journal of Petroleum Exploration and Production Technology*, September: 1-13. DOI 10.1007/s13202-013-0076-8.
- 20) Cao, P., **Karpyn, Z.T.**, and Li, L., 2013. "Dynamic changes in wellbore cement integrity due to geochemical reactions in CO<sub>2</sub>-rich environments". *Water Resources Research*, 49(6): 1-11. DOI: 10.1002/wrcr.20340.
- 21) Lee, C.-H. and **Karpyn, Z.T.**, 2012. "Numerical analysis of imbibition front evolution in fractured sandstone under capillary dominated conditions". *Transport in Porous Media*, 94(1): 359-383. DOI: 10.1007/s11242-012-0009-x.
- 22) Thararoop, P., **Karpyn, Z.T.**, and Ertekin, T., 2012. "Development of a multi-mechanistic, dual-porosity, dual-permeability, numerical flow model for coalbed methane reservoirs". *Journal of Natural Gas Science and Engineering*, 8(1): 121-131. DOI: 10.1016/j.jngse.2012.01.004.
- 23) Landry, C. and **Karpyn, Z.T.**, 2012. "Single-phase lattice Boltzmann simulations of pore-scale flow in fractured permeable media". *International Journal of Oil, Gas and Coal Technology*, 5(2/3): 182-206. DOI: 10.1504/IJOGCT.2012.046320.
- 24) Thararoop, P., **Karpyn, Z.T.**, and Ertekin, T., 2012. "Numerical studies on the effects of water presence in the coal matrix and coal shrinkage and swelling phenomena on CO<sub>2</sub>-enhanced coalbed methane recovery process". *International Journal of Oil, Gas, and Coal Technology*, 5(1): 47-65.

- 25) Nago, A., **Karpyn, Z.T.**, and Ayala H., L. F., 2011. "Multivariate production optimization of a natural gas field". *International Journal of Modeling and Simulation*, 31(3): 185-193. DOI: 10.2316/Journal.205.2011.3.205-5381.
- 26) Landry, C., **Karpyn, Z.T.**, and Piri, M., 2011. "Pore-scale analysis of trapped immiscible fluid structures and fluid interfacial areas in oil-wet and water-wet bead packs". *Geofluids*, 11(2): 209-227. DOI: 10.1111/j.1468-8123.2011.00333.x.
- 27) Basbug, B., and **Karpyn, Z.T.**, 2011. "Estimation of fracture-matrix transport properties from saturation profiles using a multivariate automatic history matching method". *Petroleum Science and Technology*, 29(9), 1-11. DOI: 10.1080/10916460903514915.
- 28) Petchsingto, T., and **Karpyn, Z.T.**, 2010. "Simulation of fluid percolation in a rough-walled rock fracture". *Hydrogeology Journal*, 18(7), 1583-1589. DOI: 10.1007/s10040-010-0632-y.
- 29) Mora, T., Orogbemi, O., and **Karpyn, Z.T.**, 2010. "A study of hydraulic fracture conductivity and its dependence on proppant wettability". *Petroleum Science and Technology*, 28(15), 1527-1534. DOI: 10.1080/10916460903070645.
- 30) Crandall, D., Bromhal, G. S., and **Karpyn Z. T.**, 2010. "Numerical simulations examining the relationship between wall-roughness and fluid flow in rock fractures". *International Journal of Rock Mechanics and Mineral Sciences*, 47(5), 784-796. DOI: 10.1016/j.ijrmmms.2010.03.015.
- 31) Lee, C.-H. and **Karpyn, Z.T.**, 2010. "Experimental investigation of rate effects on two-phase flow through fractured rocks using x-ray computed tomography". *Advances in X-Ray Microtomography for Geomaterials* (eds. Alshibli, K.A. & Reed, A.H.) 230-237 (John Wiley & Sons).
- 32) **Karpyn, Z.T.**, Piri, M., and Singh, G., 2010. "Experimental investigation of trapped oil clusters in a water-wet bead pack using x-ray microtomography". *Water Resources Research*, 46(4), W04510, 1-25. DOI: 10.1029/2008wr007539.
- 33) Prodanović, M., Bryant, S.L. and **Karpyn, Z.T.**, 2010. "Investigating matrix/fracture transfer via a level set method for drainage and imbibition". *Society of Petroleum Engineers Journal*, 15(1), 125-136.
- 34) Thararoop, P., **Karpyn, Z.T.**, and Ertekin, T., 2009. "Development of a coal shrinkage-swelling model accounting for water content in the micropores". *International Journal of Mining and Mineral Engineering*, 1(4), 346-364.
- 35) Petchsingto, T., and **Karpyn, Z.T.**, 2009. "Deterministic modeling of fluid flow through a CT-scanned fracture using computational fluid dynamics". *Energy Sources, Part A*, 31(11), 897-905. DOI: 10.1080/15567030701752842.
- 36) **Karpyn, Z.T.**, Halleck, P.M., and Grader, A.S., 2009. "An experimental study of spontaneous imbibition in fractured sandstone with contrasting sedimentary layers". *Journal of Petroleum Science and Engineering*, 67(1-2): 48-56. DOI: 10.1016/j.petrol.2009.02.014.
- 37) **Karpyn, Z.T.**, Alajmi, A., Radaelli, F., Halleck, P., and Grader, A., 2009. "X-ray CT and hydraulic evidence for a relationship between fracture conductivity and adjacent matrix porosity". *Engineering Geology*, 103(3-4): 139-145. DOI: 10.1016/j.enggeo.2008.06.017.

- 38) Thararoop, P., **Karpyn, Z.T.**, Gitman, A., and Ertekin, T. 2008. "Integration of seismic attributes and production data for infill drilling strategies – a virtual intelligence approach". *Journal of Petroleum Science and Engineering*, 63(1-4): 43-52.
- 39) Basbug, B., and **Karpyn, Z.T.**, 2008. "A study of absolute permeability dependence on pore-scale characteristics of carbonate reservoirs using artificial intelligence". *International Journal of Oil, Gas and Coal Technology*, 1(4): 382-398.
- 40) **Karpyn, Z.T.**, and Piri, M., 2007. "Prediction of fluid occupancy in fractures using network modeling and X-ray microtomography. I: Data conditioning and model description". *Physical Review E*, 76(1), 016315: 1-13.
- 41) Piri, M., and **Karpyn, Z.T.**, 2007. "Prediction of fluid occupancy in fractures using network modeling and X-ray microtomography. II: Results". *Physical Review E*, 76(1), 016316: 1-11.
- 42) Ayala H., L.F., and **Karpyn, Z.T.**, 2007. "On the calculation of static bottom-hole pressures in gas wells". *Petroleum Science and Technology*, 25(8): 1099-1104.
- 43) **Karpyn, Z.T.**, Grader, A.S. and Halleck, P.M., 2007. "Visualization of fluid occupancy in a rough fracture using micro-tomography". *Journal of Colloid and Interface Science*, 307(1): 181-187.
- 44) Li, G., **Karpyn, Z.T.**, Halleck, P.M., and Grader, A.S., 2006. "Modeling the formation of fluid banks during counter-current flow in porous media". *Transport in Porous Media*, 62(2): 125-138.
- 45) **Karpyn, Z.T.**, Li, G., Grader, A.S., and Halleck, P.M., 2006. "Experimental conditions favoring the formation of fluid banks during counter-current flow in porous media". *Transport in Porous Media*, 62(1): 109-124.
- 46) Li, G., **Karpyn, Z.T.**, Halleck, P.M., and Grader, A.S., 2005. "Numerical simulation of a CT-scanned counter-current flow experiment". *Transport in Porous Media*, 60(2): 225-240.

## TECHNICAL AND PROFESSIONAL PRESENTATIONS

### *Technical Meetings*

- 1) Tawfik, M., and **Karpyn, Z.T.**, 2016. "Pore -scale investigation of wettability alteration through chemically-tuned waterflooding in oil-wet carbonate rocks". Gordon Research Conference on Flow & Transport In Permeable Media, Girona, Spain, July 31- August 5.
- 2) Abdelmalek, B., **Karpyn, Z.T.**, and Liu, S., 2015. "An Improved Pseudo-pressure type curve approach for permeability and porosity estimation from pulse-decay data". Annual meeting of Unconventional Natural Resources Consortium. State College, PA, December 7.
- 3) Chakraborty, N., and **Karpyn, Z.T.**, 2015. "Laboratory Measurement of Effective Gas Permeability of Ultra Tight Shales and the Impact of Soaking Time". Annual meeting of Unconventional Natural Resources Consortium. State College, PA, December 7
- 4) *Chakraborty, N.*, and **Karpyn, Z.T.**, 2015. "Experimental investigation of effective gas permeability in ultra-tight shales". Foundation CMG Summit, Calgary, Canada, September 15-17.
- 5) **Karpyn, Z.T.**, 2015. "Fluid behavior and rock interactions: gas flow hindrance in fractured unconventional reservoirs". SPE Reservoir Simulation Symposium, Houston, TX, February 23-25.

- 6) Abdelmalek, B., **Karpyn, Z.T.**, and Liu, S., 2014. "Structure, mechanics and flow properties of fractured shale: core-scale experimentation and in-situ imaging". AGU Fall Meeting, San Francisco, CA, December 15-19.
- 7) Klise, K., Yoon, H., Torrealba, V., **Karpyn, Z.T.**, and Moriarty, D., 2014. "Digital image analysis of stress-dependent granular compaction and its impact on multiphase fluid distributions". AGU Fall Meeting, San Francisco, CA, December 15-19.
- 8) Chakraborty, N., and **Karpyn, Z.T.**, 2014. "Impact of hydro-frac soaking time on gas production from Marcellus cores". Annual meeting of Unconventional Natural Resources Consortium. State College, PA, November 16-17.
- 9) **Karpyn, Z.T.**, 2014. "Fluid behavior and rock interactions – Fractured Rocks," Foundation CMG Summit, Calgary, Canada, September 24-26.
- 10) Cao, P., **Karpyn, Z.T.**, and Li, L., 2014. "Chemical degradation and evolution of transport properties of wellbore cement in CO<sub>2</sub>-rich media". Gordon Research Conference on Flow & Transport In Permeable Media, Bates College, Lewiston, ME, July 6-11.
- 11) Torrealba, V., **Karpyn, Z.T.**, Yoon, H., Klise, K., and Crandall, D., 2014. "Stress deformation of unconsolidated porous media and its impact on pore geometry and phase trapping". Geosciences Research Symposia, U.S. Department of Energy, Office of Basic Energy Sciences, Gaithersburg, Maryland, May 15-16.
- 12) Cao, P., **Karpyn, Z.T.**, and Li, L., 2013. "Porosity and permeability evolution in cemented rock cores under reactive flowing conditions: Comparative analysis between limestone and sandstone host rocks". AGU Fall Meeting, San Francisco, CA, December 9-13.
- 13) Landry, C., **Karpyn, Z.T.**, and Ayala, O., 2013. "Pore-scale lattice Boltzmann modeling and 4D x-ray computed microtomography imaging of fracture-matrix fluid transfer". AGU Fall Meeting, San Francisco, CA, December 9-13.
- 14) Torrealba, V., **Karpyn, Z.T.**, Yoon, H., Hart, D., Klise, K., and Crandall, D., 2013. "Pore-Scale investigation on stress-dependent characteristics of granular packs and their impact on multiphase fluid distribution". AGU Fall Meeting, San Francisco, CA, December 9-13.
- 15) **Karpyn, Z.T.**, and Ayala H., L.F., 2013. "Experimental investigation of gas production impairment due to spontaneous imbibition of fracturing fluid". Annual meeting of Unconventional Natural Resources Consortium, State College, PA, October 22-23.
- 16) Alexis, D., **Karpyn, Z.T.**, Ertekin, T., and Crandall, D., 2013. "Experimental investigation of multiphase fluid transport characteristics in coal fractures," International Conference on Coal Science & Technology, State College, PA, Sept. 29 - Oct. 3.
- 17) Alexis, D., **Karpyn, Z.T.**, Ertekin, T., and Crandall, D., 2013. "Effects of net stress on two-phase flow in coal fractures". SPE/AAPG/SEG Unconventional resources technology conference, Denver, CO, August 12-14.
- 18) **Karpyn, Z.T.**, 2013. "Experimental investigation of shale gas production impairment due to spontaneous imbibition of fracturing fluid following wellbore stimulation". SIAM Conference on Mathematical and Computational Issues in the Geosciences, Padua, Italy, June 17-20.
- 19) Cao, P., **Karpyn, Z.T.**, and Li, L., 2013. "Evolution of voids and fractures in wellbore cement under dynamic flow conditions relevant to geological carbon sequestration". AAPG 2013 Annual Convention & Exhibition, Pittsburgh, PA, May 19-22.

- 20) Eide, Ø., Fernø, M., **Karpyn, Z.T.**, Haugen, Å., and Graue, A., 2013. "CO<sub>2</sub> injections for enhanced oil recovery visualized with an industrial CT-scanner". 17th European Symposium on Improved Oil Recovery, European Association of Geoscientists & Engineers, Saint Petersburg, Russia, April 16-18.
- 21) Bansal, Y., Ertekin, T., **Karpyn, Z.T.**, Ayala H., L.F., Nejad, A., Suleen, Balogun, O., Liebmann, D., and Sun, Q., 2013. "Forecasting well performance in a discontinuous tight oil reservoir using artificial neural networks". SPE Unconventional Resources Conference, The Woodlands, TX, 10-12 April.
- 22) Cao, P, **Karpyn, Z.T.**, and Li, L., 2012. "Property evolution of fractured wellbore cement under dynamic flow conditions relevant to geological carbon sequestration". AGU Fall Meeting, San Francisco, CA, December 3-7.
- 23) Landry, C., **Karpyn, Z.T.**, and Ayala, O.M., 2012. "Saturation-history-dependent wettability and its impact on macroscale two-phase flow: As determined by lattice Boltzmann modeling". AGU Fall Meeting, San Francisco, CA, December 3-7.
- 24) Brunet, J.-P., Li, L., **Karpyn, Z.T.**, Strazisar, B., and Kutcho, B., 2012. "Cement degradation under conditions relevant to geological carbon sequestration". AIChE Annual Meeting, Pittsburgh, PA, October 28 – November 2.
- 25) Landry, C., and **Karpyn, Z.T.**, 2012. "4D x-ray computed microtomography imaging of oil/water/surfactant flow in a fractured porous medium and determination of fracture permeability by lattice Boltzmann modeling". Gordon Research Conference on Flow & Transport in Permeable Media, Les Diablerets, Switzerland, June 24-29.
- 26) Dutta, R., Lee, C.-H., Odumabo, S., Ye, P., Walker, S.C., **Karpyn, Z.T.**, and Ayala H., L.F., 2012. "Quantification of fracturing fluid migration due to spontaneous imbibition in fractured tight formations". SPE Americas Unconventional Gas Resources, Pittsburgh, PA, June 5-7.
- 27) Li, X., and **Karpyn, Z.T.**, 2012. "Experimental investigation of carbon dioxide trapping due to capillary retention in saline aquifers". 4th International Conference on Porous Media & Annual Meeting of the International Society for Porous Media, Purdue University, West Lafayette, Indiana, May 14-16.
- 28) Tokan-Lawal, A., Wang, W., Prodanović, M., and **Karpyn, Z.T.**, 2012. "Tortuosity and relative permeability of microfractured formations". 4th International Conference on Porous Media & Annual Meeting of the International Society for Porous Media, Purdue University, West Lafayette, Indiana, May 14-16.
- 29) Klise, K., McKenna, S.A., **Karpyn, Z.T.**, and Celauro, J., 2012. "Modified invasion percolation models for multiphase processes". Research Symposia on Geophysical Properties and Processes, U.S. Department of Energy, Office of Basic Energy Sciences, Gaithersburg, Maryland, April 5-6.
- 30) Lee, C. -H., and **Karpyn, Z.T.**, 2010. "Dynamic visual monitoring of spontaneous imbibition in unsaturated fractured porous media". AGU Fall Meeting, San Francisco, CA, December 13-17.
- 31) **Karpyn, Z.T.**, and Lee, C. -H., 2010. "Imaging imbibition front evolution in fractured permeable media". Gordon Research Conference on Flow & Transport in Permeable Media, Bates College, Lewiston, ME, July 11-16.
- 32) Lee, C. -H., and **Karpyn, Z.T.**, 2010. "Experimental investigation of rate effects on two-phase flow through fractured rocks using x-ray computed tomography". GeoX 2010, 3rd International Workshop on X-Ray CT for Geomaterials, New Orleans, LA, March 1-3.

- 33) **Karpyn, Z.T.**, Piri, M., Singh, G., and Landry, C. J., 2009. "Characterization of fluid micro-structures in porous media and their relation to wettability". AGU Fall Meeting, San Francisco, CA, December 14-18.
- 34) Landry, C. J., **Karpyn, Z.T.**, and Piri, M., 2009. "Quantification of immiscible fluid distribution of an oil-wet and water-wet bead pack imaged using x-ray computed microtomography". AGU Fall Meeting, San Francisco, CA, December 14-18.
- 35) Basbug, B., and **Karpyn, Z.T.**, 2008. "Determination of relative permeability and capillary pressure curves using an automated history matching approach". SPE Eastern Regional / AAPG Eastern Section Joint Meeting, Pittsburgh, PA, October 11-15.
- 36) Prodanović, M., Bryant, S.L. and **Karpyn, Z.T.**, 2008. "Investigating matrix-fracture transfer via a level set method for drainage and imbibition". SPE Annual Technical Conference and Exhibition, Denver, CO, September 21-24.
- 37) Petchsingto, T., and **Karpyn, Z.T.**, 2007. "Characterization of fracture capillary pressure from geostatistical analysis of rough fracture structures". AGU Fall Meeting, San Francisco, CA, December 10-14.
- 38) Ertekin, T., Thararoop, P., **Karpyn, Z. T.**, and Gitman, A., 2007. "Integration of seismic attributes and production data in field development and planning". 17th Istanbul Technical University Petroleum and Natural Gas Seminar and Exhibition, Istanbul, Turkey, June7-8.
- 39) Basbug, B., and **Karpyn, Z.T.**, 2007. "Examination of porosity-permeability relationships using artificial neural networks". SPE Latin American and Caribbean Petroleum Engineering Conference, Buenos Aires, Argentina, April 15-18.
- 40) **Karpyn, Z.T.**, and Piri, M., 2006. "Prediction of fluid occupancy in fractures using network modeling and X-ray microtomography". AGU Fall Meeting, San Francisco, California, December 11-15.
- 41) Petchsingto, T., and **Karpyn, Z.T.**, 2006. "Micromodel investigation of capillary pressures in a rough CT-scanned fracture". AGU Fall Meeting, San Francisco, CA, December 11-15.
- 42) Piri, M., and **Karpyn, Z.T.**, 2006. "Pore-scale network modeling of two-phase flow in a CT-scanned fracture", Gordon Research Conferences, Flow & Transport in Permeable Media, Andover, NH, July 30 - August 4.
- 43) **Karpyn, Z.T.**, Halleck, P.M., and Grader, A.S., 2006. "Fracture-matrix transport dominated by capillary-driven flow in layered sandstone". Paper presented at the Fifteenth SPE Improved Oil Recovery Symposium, Tulsa, OK, April 22-26.
- 44) **Karpyn, Z.T.**, Grader, A.S., and Halleck, P.M., 2005. "Quantitative visualization of fluid occupancy in a vertical fracture under static and dynamic flowing conditions". Proceedings, AGU Fall Meeting, San Francisco, CA, December 5-9.
- 45) Enunwa, C., Razzano Iii, J.L., Ramgulam, A., Flemings, P.B., Ertekin, T., and **Karpyn, Z.T.**, 2005. "Tahoe field case study - understanding reservoir compartmentalization in a channel-levee system", Gulf Coast Association of Geological Societies Annual Convention, New Orleans, LA, September 25-27.
- 46) Narzidoust, K., Ahmadi, G., **Karpyn Z.T.**, Grader, A.S., Halleck, P.M., Mazaheri, A., and Smith, D., 2005. "Gas-liquid flows through a rock fracture". Proceedings, ASME Fluid Engineering Summer Conference, Houston, TX, June 19-23.



***Seminars and Workshops (Invited)***

- 1) "X-ray microtomography imaging of.....lots-o-stuff". Millennium café seminar series, Materials Research Institute, The Pennsylvania State University, September 8, 2015.
- 2) "Multiphase flow in reservoir rocks: An experimental investigation on gas production impairment due to fracturing fluid loss". Fluid Dynamics Research Consortium (FDRC) seminar, The Pennsylvania State University, October 31, 2013.
- 3) "Experimental investigation of gas production impairment due to spontaneous imbibition of fracturing fluid". Graduate Seminar Series, Harold Vance Department of Petroleum Engineering, Texas A&M University, October 22-23, 2013.
- 4) "COMPASS: Communicating Complexity in a Rapidly Changing World: A Science Communication Workshop". Workshop sponsored by the Penn State Institutes for Energy and the Environment (PSIEE) and Earth and Environmental Systems Institute (EESI), September 26-27, 2013.
- 5) "Experimental investigation of shale gas production impairment due to spontaneous imbibition of fracturing fluid following wellbore stimulation," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Padua, Italy, June 17-20, 2013.
- 6) "Experimental investigation of conditions affecting wellbore cement integrity in geo-sequestration environments". Graduate Seminar Series, Department of Civil and Environmental Engineering, Lehigh University, May 15, 2013.
- 7) "Visualization of Natural and Synthetic Porous Materials". Millennium café seminar series, Materials Research Institute, The Pennsylvania State University, March 30, 2013.
- 8) "Experimental investigation of conditions affecting wellbore cement integrity in geo-sequestration environments". Graduate Seminar Series, Department of Civil and Environmental Engineering, The Pennsylvania State University, March 29, 2013.
- 9) "Geo-sequestration of carbon dioxide in saline aquifers: experiments on capillary trapping". Energy Exchange Seminar Series, EMS Energy Institute, The Pennsylvania State University. February 13, 2013.
- 10) "A Study of Predominant Flow Mechanisms and Parameters Controlling Contaminant Migration in Fractured Heterogeneous Rocks". NSF CMMI Research and Innovation Conference, Boston, MA, July 9-11, 2012.
- 11) "Image data analysis of fractured porous media". Workshop on Image Analysis for Porous Media, Department of Petroleum and Geosystems Engineering, The University of Texas at Austin, July 14-15, 2011.
- 12) "Spontaneous underground migration of water-based fracturing fluids used in shale gas reservoir stimulation," Upstream Shale Gas and Environmental Summit, Pittsburgh, Pennsylvania, September 29-30, 2010.
- 13) "Characterization of transport mechanisms in fractured porous media", Polymer Physics Seminar Series, Department of Materials Science and Engineering, The Pennsylvania State University, July 6, 2010.

- 14) "The devil is in the details: exploring transport mechanisms in fractured porous media using X-ray microtomography", Graduate Seminar Series, Department of Chemical & Biomolecular Engineering, University of Houston, September 29, 2009.
- 15) "The devil is in the details: exploring transport mechanisms in fractured rocks with X-ray microtomography", Graduate Seminar Series, Department of Chemical & Petroleum Engineering, University of Wyoming, April 22, 2009.
- 16) The National Science Foundation - ADVANCE: "Cross-Disciplinary Initiative for Minority Women Faculty", Georgia Institute of Technology, Atlanta, Georgia, April, 2008.
- 17) Karpyn, Z.T., Dickey, E., Hale, B.J., and Beisler, M., "Pursuing Careers in Industry vs. Academia", Discussion Panel at the 2008 VOICES Conference for Women Graduate Students, The Pennsylvania State University, March 2, 2008.
- 18) "Visualization of fluid transport in fractured rocks using X-ray Computed Tomography", Graduate Seminar Series, Department of Petroleum and Geosystems Engineering, The University of Texas at Austin, January 28, 2008.
- 19) The Teaching Professor Conference: "Creating effective learning environments and teaching techniques", Atlanta, Georgia, May, 2007.
- 20) Karpyn, Z.T., Chadee, W., Chang, H., Joslin, T. and Sprunt, E., "Experiences of women in the petroleum industry", Discussion Panel at the Annual Technical Conference and Exhibition, Dallas, Texas, October 9-12, 2005.

## TEACHING INTERESTS

### *Courses Taught*

- **PNG 405: ROCK AND FLUID PROPERTIES** - Introduction to petroleum reservoir rock and fluid properties, coring methods, and principles of flow in porous media.
- **PNG 406: ROCK AND FLUID LABORATORY** - Systematic study of oil reservoir rocks and fluids, and their interrelation applied to petroleum engineering.
- **PNG 475: PRODUCTION AND COMPLETIONS ENGINEERING** – Well inflow performance and subsurface production principles of oil and gas reservoirs.
- **PNG 501: FUNDAMENTALS OF FLOW IN POROUS MEDIA** – Principles and formulation of problems of fluid flow in porous media.
- **PNG 590: COLLOQUIUM** - graduate seminars series.
- **EGEE 101: ENERGY AND THE ENVIRONMENT** - Energy utilization and technological development, energy resources, conversion and consequences on the local and global environment, and future energy alternatives.

## PROFESSIONAL ACTIVITIES

### *Service to the profession*

- *Assistant Editor-in-Chief*, Journal of Petroleum Science and Engineering, 2014-present.
- *Associate Editor*, Society of Petroleum Engineers Editorial Review Committee, Society of Petroleum Engineers Journal, 2009-2014.
- *NAS Workshop participant*, Development of Unconventional Hydrocarbon Resources in the Appalachian Basin, The National Academy of Sciences. West Virginia University, September 9-10, 2013
- *Guest Editor*, Special issue of International Journal of Oil, Gas and Coal Technology, "Pore-Scale Flow and Transport Processes in Petroleum Reservoirs", 2010-2011.

- *Groundwater Flow Specialist*, for the development and design of an interactive groundwater flow exhibit in collaboration with the Carnegie Science Center, Pittsburgh, PA, 2009-2011.
- *Technical Editor*, Society of Petroleum Engineers Editorial Review Committee, Reservoir Evaluation & Engineering Journal, 2005-2009.
- *Conference committee member*, organizing conferences:
  - *Member*, Program Committee – Reservoir Engineering, 2012 SPE Annual Technical Conference and Exhibition, San Antonio, Texas, October 8-10.
  - *Member*, Program Committee – Reservoir Engineering, 2011 SPE Annual Technical Conference and Exhibition, Denver, Colorado, October 30 – November 2.
  - *Member*, Technical Review Committee, GeoX 2010, 3rd International Workshop on X-Ray CT for Geomaterials, New Orleans, Louisiana, March 1-3.
  - *Member*, Technical Review Committee, 2010 SPE Eastern Regional Meeting, Morgantown, West Virginia, October 12-14.
  - *Co-Chair*, Program Committee, 2008 Joint AAPG–SPE Eastern Meeting – Conference and Exhibition, Pittsburgh, Pennsylvania, October 11-15.
  - *Member*, Technical Review Committee, 2007 SPE Latin American & Caribbean Petroleum Engineering Conference, Buenos Aires, Argentina, April 15-18.
  - *Session Chair*, 2007 SPE Latin American & Caribbean Petroleum Engineering Conference, Buenos Aires, Argentina, April 15-18.
- *Technical reviewer of research grants*:
  - Earth Sciences (EAR) – Hydrologic Sciences, National Science Foundation, 2015.
  - Early Career Research Program, Office of Science, U.S. Department of Energy, 2015.
  - Natural Sciences and Engineering Research Council of Canada (NSERC), 2014.
  - Office of Basic Energy Sciences (BES), U.S. Department of Energy, 2011, 2013, 2014.
  - The Petroleum Research Fund, New Directions Proposal, American Chemical Society (ACS-PRF ND), 2011, 2013, and 2014.
  - Faculty Early Career Development (CAREER) Program, National Science Foundation, 2012.
  - The Petroleum Research Fund, Doctoral New Investigator Proposal, American Chemical Society (ACS-PRF DNI), 2008.
- *Technical reviewer of refereed journals* (2005-present), including Advances in Water Resources; Energy & Fuel; Engineering Geology; Environmental Science & Technology; Fluid Phase Equilibria; Geochemistry, Geophysics, Geosystems (G-Cubed); Geophysical Research Letters; International Journal of Oil, Gas and Coal Technology; Journal of Contaminant Hydrology; Journal of Petroleum Science and Engineering; SPE Reservoir Evaluation & Engineering; SPE Journal; Transport in Porous Media; Water Resources Research

### **Contributions to enhancing cultural diversity**

- *Appointed member*, Commission for Women (CFW), Office of the Vice Provost for Educational Equity, CFW serves as an advisory group to the President of the University on the status of women at Penn State, advocates for women's concerns, and recommends solutions, July, 2013 – June, 2016.
- *Chair*, Faculty Focus Committee, Commission for Women (CFW), Office of the Vice Provost for Educational Equity, collaborate with other Presidential Equity Commissions (CORED CLGBTE) to advocate for underrepresented faculty members on issues concerning pre-tenure and fixed-term faculty appointments, July, 2013 – June, 2016.
- *Faculty mentor*, Summer Research Opportunities Program (SROP), Summer 2011. Penn State's Office of Graduate Educational Equity Programs works in partnership with the Committee on Institutional Cooperation (CIC) to design an eight-week research program to interest talented undergraduate students from underrepresented groups in academic careers.
- *Faculty coordinator*, Summer Experience in Earth and Mineral Sciences: SEEMS 2007-2010. Faculty coordinator of summer research experience for high-school students from underrepresented groups.
- *Member*, Diversity Council, appointed by the Dean of the College of Earth and Mineral Sciences, 2005-2007.