James G. Berryman
PUBLICATIONS, REPORTS, AND TALKS

* 50-99 citations
** 100-149 citations
**** 200 citations or more

DISORDERED ALLOYS

Ph.D. Thesis

1. J. G. Berryman, "Theoretical studies of the frequency dependent electrical conductivity for disordered alloys," *Ph.D. Thesis* (University of Wisconsin, 1975).

Papers

2. J. G. Berryman, "Physical interpretation of the Economou-Cohen criterion of localization," *Phys. Lett. A* **57**, 279-281 (1976).

3. J. G. Berryman, "Low-concentration limit of the frequency-dependent electrical conductivity for disordered binary alloys," *Phys. Rev. B* **14**, 829-832 (1976). (Also, *Bull. Am. Phys. Soc.* **20**, 375 (1975).)

4. J. G. Berryman and S. P. Bowen, "The frequency dependent electrical conductivity for disordered alloys: Application of an abstract Hilbert space generalization of Feenberg's perturbation theory," *J. Math. Phys.* **17**, 2182-2191 (1976). **MR 57:2368**.

NONLINEAR WATER WAVES AND PLASMA DIFFUSION

Papers

5. J. G. Berryman, "Stability of solitary waves in shallow water," *Phys. Fluids* **19**, 771-777 (1976); "Reply to comment by R. Van Dooren," *Phys. Fluids* **22**, 1588-1589 (1979). **MR 80f:76005**

6. J. R. Drake and J. G. Berryman, "Theory of nonlinear diffusion of plasma across the magnetic field of a toroidal multipole," *Phys. Fluids* **20**, 851-857 (1977).

7. J. G. Berryman, "Evolution of a stable profile for a class of nonlinear diffusion equations with fixed boundaries," *J. Math. Phys.* **18**, 2108-2115 (1977).

8. J. G. Berryman and C. J. Holland, "Nonlinear diffusion problem arising in plasma physics," *Phys. Rev. Lett.* **40**, 1720-1722 (1978). **MR 58:14366**

9. J. G. Berryman and C. J. Holland, "Evolution of a stable profile for a class of nonlinear diffusion equations II," *J. Math. Phys.* **19**, 2476-2480 (1978).

10. C. J. Holland and J. G. Berryman, "A nonlinear generalization of the heat equation arising in plasma physics," in *Applied Nonlinear Analysis*, edited by V. Lakshmikantham, Proceedings of an International Conference on Applied Nonlinear Analysis, April

20-23, 1978, University of Texas at Arlington (Academic Press, New York, 1979), pp. 61-66. **MR 80g:82032**

11. J. G. Berryman, "Extinction time for fast diffusion," *Phys. Lett. A* **72**, 107-110 (1979).

*12. C. J. Holland and J. G. Berryman, "Stability of the separable solution for fast diffusion," *Arch. Rational Mech. Anal.* **74**, 379-388 (1980). **MR 81m:35065**

13. J. G. Berryman, "Evolution of a stable profile for a class of nonlinear diffusion equations III. Slow diffusion on the line," *J. Math. Phys.* **21**, 1326-1331 (1980).

14. J. G. Berryman and C. J. Holland, "Asymptotic behavior of the nonlinear diffusion equation $n_t = (n^{-1}n_x)_x$," *J. Math. Phys.* **23**, 983-987 (1982). (Also, LLNL UCRL-86871, November, 1981.) **MR 83m:35070**

15. J. G. Berryman, "Stability analysis of Kamimura-Dawson diffusion in a collisionless plasma," *J. Appl. Phys.* **54**, 425-426 (1983). (Also, LLNL UCRL-86783, November, 1981.)

16. C. J. Holland and J. G. Berryman, "Exponential convergence for nonlinear diffusion problems with positive lateral boundary conditions," *J. Math. Phys.* **26**, 660-663 (1985). **MR 86f:35103**

17. C. J. Holland and J. G. Berryman, "The first boundary value problem for nonlinear diffusion," in *Trends in the Theory and Practice of Non-Linear Analysis*, edited by V. Lakshmikantham (North-Holland, Amsterdam, 1985), pp. 183-186. **MR 87a:00035**

TOWED SONAR TECHNOLOGY

Papers

18. S. H. Francis, M. Slazak, and J. G. Berryman, "Response of elastic cylinders to convective flow noise I. Homogeneous, layered cylinders," *J. Acoust. Soc. Am.* **75**, 166-172 (1984).

J. G. Berryman and M. Slazak, "Response of elastic cylinders to convective flow noise II. Fluid-saturated porous, layered cylinders," in preparation.

Internal Reports : Bell Labs

J. G. Berryman, "Submarine Sonar Project – Handling Equipment Test Plans," Case 29071-200, Bell Laboratories, EN-79-6216-10, March 19, 1979.

J. G. Berryman, "Submarine Sonar Project – Handling Equipment Analysis for a Thin Line Array," Case 29071, Bell Laboratories, TM-79-6216-1, April 12, 1979.

J. G. Berryman, "Traction Unit Acceleration for the AN/BQR-15 Array Modification Program," Case 29203-100, Bell Laboratories, MF-79-6216-53, December 14, 1979.

J. G. Berryman, "Analysis of Drogue Length for the AN/BQR-15 Array Modification Program," Case 29263-100, Bell Laboratories, EN-80-6216-42, July 31, 1980.

J. G. Berryman and I. Pelech, "Stowage Tube Test for the AN/BQR-15 Array Modification Program," Case 29263-100, Bell Laboratories, TM-80-6216-7, September 15, 1980.

J. G. Berryman, "Analysis of the Stick-Slip Phenomenon Observed in the Stowage Tube Test for the AN/BQR-15 Array Modification Program," Case 29263-100, Bell Laboratories, FM-80-6216-69, October 23, 1980.

GRANULAR MATERIALS

Papers

****19. J. G. Berryman, "Random close packing of hard spheres and disks," *Phys. Rev. A* **27**, 1053-1061 (1983). (Also, LLNL UCRL-87949, July, 1982.)

20. J. G. Berryman, "Definition of dense random packing," in *Advances in the Mechanics and the Flow of Granular Materials*, edited by M. Shahinpoor (Trans-Tech, Clausthal, Germany, 1983), Vol. I, pp. 1-18. (Also, LLNL UCRL-88399, November, 1982.)

21. D. Elata and J. G. Berryman, "Contact force-displacement laws and the mechanical behavior of random packs of identical spheres," *Mech. Materials* **24**, 229–240 (1996). (Also, LLNL UCRL-JC-122580, November, 1995.) (Also, Stanford Rock Physics and Borehole Geophysics Project, Volume 62, June, 1996, paper G12.)

22. D. L. Johnson, L. M. Schwartz, D. Elata, J. G. Berryman, B. Hornby, and A. N. Norris, "Linear and non-linear elasticity of granular media: Stress-induced anisotropy of a random sphere pack," in *Proceedings of Powders and Grain 97*, Association for the Study of the Micromechanics of Granular Media, 3rd International Conference on Micromechanics of Granular Media, Durham, North Carolina, May 18–23, 1997 (Balkema, Rotterdam, 1997), pp. 243–246.

23. D. L. Johnson, L. M. Schwartz, D. Elata, J. G. Berryman, B. Hornby, and A. N. Norris, "Linear and nonlinear elasticity of granular media: Stress-induced anisotropy of a random sphere pack," *ASME J. Appl. Mech.* **65**, 380–388 (1998). (Also, LLNL UCRL-124202, May, 1996.)

24. J. Dvorkin, J. Berryman, and A. Nur, "Elastic moduli of cemented sphere packs," *Mech. Mat.* **31**, 461–469 (1999). (Also, Stanford Rock Physics and Borehole Geophysics Project, Annual Report, Volume 63, paper A6, June, 1997.) (Also, LLNL UCRL-JC-128340, August, 1997.)

25. E. J. Garboczi and J. G. Berryman, "New effective medium theory for the diffusivity or conductivity of a multi-scale concrete microstructure model," *Concrete Science and*

Engineering **2**, 88–96 (2000). (Also, LLNL UCRL-JC-136353, October, 1999.)

26. E. J. Garboczi and J. G. Berryman, "New differential effective medium theory for the linear elastic moduli of a material containing composite inclusions," *Mech. Materials* **33**, 455–470 (2001). (Also, LLNL UCRL-JC-137075, January, 2000.)

Talks at Conferences and Workshops

J. G. Berryman, "Dense random packing in two and three dimensions," invited talk at the University of California Conference on Statistical Mechanics, UC-Davis, March 29-31, 1984. (Also, LLNL UCRL-90031, November, 1983.)

L. M. Schwartz, W. F. Murphy, III, and J. G. Berryman, "Stress-induced transverse isotropy in rocks," talk at the Workshop on Mechanics and Statistical Physics of Particulate Materials, Institute for Mechanics and Materials, La Jolla, CA, June 8–10, 1994.

Conference Proceedings

L. M. Schwartz, W. F. Murphy, III, and J. G. Berryman, "Stress-induced transverse isotropy in rocks," *Proceedings of the Society of Exploration Geophysicists, Annual Meeting, Los Angeles, CA, October 23–27, 1994*, pp. 1081–1085. (Also, Stanford Exploration Project Report **80**, 311–322 (1994).) (Also, LLNL UCRL-JC-116416, March, 1994.)

WAVE PROPAGATION IN POROUS MEDIA – BIOT/GASSMANN

Papers

27. J. G. Berryman, "Confirmation of Biot's theory," *Appl. Phys. Lett.* **37, 382–384 (1980).

28. J. G. Berryman, "Elastic wave propagation in fluid-saturated porous media," *J. Acoust. Soc. Am.* **69**, 416–424 (1981).

29. J. G. Berryman, "Elastic wave propagation in fluid-saturated porous media II," *J. Acoust. Soc. Am.* **70**, 1754–1756 (1981).

30. J. G. Berryman, "Elastic waves in fluid-saturated porous media," in *Lecture Notes in Physics #154*, edited by R. Burridge, S. Childress, and G. Papanicolaou, Proceedings of the Conference on Macroscopic Properties of Disordered Media, June 1-3, 1981, Courant Institute, New York University (Springer-Verlag, Berlin, 1982), pp. 38–50.

31. J. G. Berryman, B. P. Bonner, and R. C. Y. Chin, "Evidence for correlation of ultrasonic attenuation and fluid permeability in very low porosity water-saturated rocks," *Geophys. Res. Lett.* **10**, 595-598 (1983). (Also, LLNL UCRL-88253, October, 1982.)

32. J. G. Berryman, B. P. Bonner, R. C. Y. Chin, and G. W. Hedstrom, "Theory of pulse

propagation in fluid-saturated porous layers," *Proceedings of IEEE 1983 Ultrasonics Symposium at Atlanta, GA, Oct. 31-Nov. 2, 1983* (IEEE, New York, 1983), Vol. 2, pp. 972–976. Abstract appeared in *IEEE Sonics and Ultrasonics* **32**, 93–94 (1985). (Also, LLNL UCRL-89397, October, 1983.)

33. R. C. Y. Chin, J. G. Berryman, and G. W. Hedstrom, "Generalized ray expansion for pulse propagation and attenuation in fluid-saturated porous media," *Wave Motion* **7**, 43–66 (1985). (Also, LLNL UCRL-89990, November, 1983.)

34. J. G. Berryman, "Dispersion of extensional waves in fluid-saturated porous cylinders at ultrasonic frequencies," *J. Acoust. Soc. Am.* **74**, 1805–1812 (1983). (Also, LLNL UCRL-89386, June, 1983.) — **Reprinted in:** *Seismic and Acoustic Velocities in Reservoir Rocks*, Vol. 2, Theoretical and Model Studies, edited by Z. Wang and A. Nur (Society of Exploration Geophysicists, Tulsa, Oklahoma, 1992), pp. 436–443.

35. J. G. Berryman, "Effective conductivity by fluid analogy for a porous insulator filled with a conductor," *Phys. Rev. B* **27**, 7789–7792 (1983). (Also, LLNL UCRL-88557, January, 1983.)

36. J. G. Berryman and L. Thigpen, "Nonlinear and semilinear dynamic poroelasticity with microstructure," *J. Mech. Phys. Solids* **33**, 97–116 (1985). (Also, LLNL UCRL-89925, October, 1983.)

37. L. Thigpen and J. G. Berryman, "Mechanics of porous elastic materials containing multiphase fluid," *Int. J. Eng. Sci.* **23**, 1203–1214 (1985). (Also, LLNL UCRL-90610, March, 1984.) **MR 87a:73040**

38. J. G. Berryman and L. Thigpen, "Linear dynamic poroelasticity with microstructure for partially saturated porous solids," *ASME J. Appl. Mech.* **52** (2), 345–350 (1985). (Also, LLNL UCRL-90755, May, 1984.) **MR 86f:76051**

39. J. G. Berryman, "Scattering by a spherical inhomogeneity in a fluid-saturated porous medium," *J. Math. Phys.* **26**, 1408–1419 (1985). (Also, LLNL UCRL-91649, October, 1984.) **MR 87f:76102**

40. J. G. Berryman and L. Thigpen, "Effective constants for wave propagation through partially saturated porous media," *Appl. Phys. Lett.* **46**, 722–724 (1985). (Also, LLNL UCRL-91706, October, 1984.)

41. J. G. Berryman and L. Thigpen, "Effective medium theory for partially saturated porous solids," in *Multiple Scattering of Waves in Random Media and Random Rough Surfaces*, edited by V. V. Varadan and V. K. Varadan, *Proceedings of an International Symposium held at Pennsylvania State University, University Park, PA, July 29-August 2, 1985* (Pennsylvania State University, University Park, PA, 1987), pp. 257–266. (Also, LLNL UCRL-92358, July, 1985.)

42. J. G. Berryman, "Effective medium approximation for elastic constants of porous solids with microscopic heterogeneity," *J. Appl. Phys.* **59**, 1136–1140 (1986). (Also, LLNL UCRL-93214, August, 1985.)

43. J. G. Berryman and L. Thigpen, "Physics of wave propagation in wet alluvium: A progress report," in *Proceedings of the 3rd Containment Symposium, Idaho Falls, Idaho, September 9-13, 1985,* **Vol. 2**, pp. 165–178. (Also, LLNL UCRL-92359, September, 1985.)

44. J. G. Berryman, "Elastic wave attenuation in rocks containing fluids," *Appl. Phys. Lett.* **49**, 552–554 (1986). (Also, LLNL UCRL-94451, April, 1986.)

45. J. G. Berryman and L. Thigpen, "Extensions of Biot's theory of poroelasticity to complex porous media," in *Physics and Chemistry of Porous Media II – AIP Conference Proceedings #154, Proceedings of the Second International Symposium on Physics and Chemistry of Porous Media, Schlumberger-Doll Research, October 15–17, 1986,* edited by J. R. Banavar, J. Koplik, and K. W. Winkler (American Institute of Physics, New York, 1987), pp. 209–228. (Also, LLNL UCRL-95291, September, 1986.)

46. J. G. Berryman, "Seismic wave attenuation in fluid-saturated porous media," *J. Pure Appl. Geophys. (PAGEOPH)* **128**, 423–432 (1988). (Also, LLNL UCRL-96054, February, 1987.)

47. J. G. Berryman, L. Thigpen, and R. C. Y. Chin, "Bulk wave propagation for partially saturated porous solids," *J. Acoust. Soc. Am.* **84**, 360–373 (1988). (Also, LLNL UCRL-97228, August, 1987.)

48. J. G. Berryman and G. W. Milton, "Exact results for generalized Gassmann's equations in composite porous media with two constituents," *Geophysics* **56** (12), 1950–1960 (1991). (Also, LLNL UCRL-JC-106174, January, 1991.) — **Reprinted in:** *Seismic and Acoustic Velocities in Reservoir Rocks*, Vol. 3, Recent Developments, edited by Z. Wang and A. Nur (Society of Exploration Geophysicists, Tulsa, Oklahoma, 2000), pp. 33–43.

49. J. G. Berryman, "Waves in partially saturated porous media," in *Wave Propagation and Inversion*, W. E. Fitzgibbon and M. F. Wheeler (eds.), OT35, Proceedings of the SIAM Conference on Mathematical and Computational Issues in Geophysical Fluid and Solid Mechanics, September 25-29, 1989, Houston, Texas (SIAM, Philadelphia, 1992), pp. 1–25. **MR1177666 (93f:73033)** (Also, LLNL UCRL-102729, January, 1990.)

50. J. G. Berryman, "Single-scattering approximations for coefficients in Biot's equations of poroelasticity," *J. Acoust. Soc. Am.* **91**, 551–571 (1992). (Also, LLNL UCRL-JC-106515, February, 1991.)

51. J. G. Berryman and G. W. Milton, "Exact results in linear thermomechanics of fluid-saturated porous media," *Appl. Phys. Lett.* **61**, 2030–2032 (1992). (Also, LLNL UCRL-JC-110180, April, 1992.)

52. J. G. Berryman and D. E. Lumley, "Inverting ultrasonic data on solid/fluid mixtures for Biot-Gassmann parameters," in *Second International Conference on Mathematical and Numerical Aspects of Wave Propagation*, Proceedings of the Second International Conference on Mathematical and Numerical Aspects of Wave Propagation, SIAM, June 7–10, 1993, Clayton Hall, University of Delaware, edited by R. Kleinman, T. Angell, D. Colton, F. Santosa, and I. Stakgold (SIAM, Philadelphia, 1993), pp. 57–68. (Also, LLNL UCRL-JC-112052, November, 1992).

53. S. R. Pride and J. G. Berryman, "Connecting theory to experiment in poroelasticity," *J. Mech. Phys. Solids* **46**, 719–747 (1998). **MR1621646 (99a:73013)** (Also, LLNL UCRL-JC-125624, October, 1996.)

54. J. G. Berryman and S. R. Pride, "Volume averaging, effective stress rules, and inversion for microstructural response of multicomponent porous media," *Int. J. Solids Struct.* **35**, 4811–4843 (1998). (Also, LLNL UCRL-JC-127248, April, 1997.)

55. J. G. Berryman, "Rocks as poroelastic composites," in *Poromechanics: A Tribute to Maurice A. Biot*, Proceedings of the Biot Conference on Poromechanics, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, September 14–16, 1998 (Balkema, Rotterdam, 1998), pp. 11–16. (Also, Stanford Exploration Project Sponsors Report **SEP-97**, June, 1998.) (Also, LLNL UCRL-JC-130699, April, 1998.)

56. J. G. Berryman, "Origin of Gassmann's equations," *Geophysics* **64** (5), 1627–1629 (1999). [tutorial] (Also, Stanford Exploration Project Report **SEP-102**, October, 1999, pp. 187–192.) (Also, LLNL UCRL-JC-132372, November, 1998.)

57. J. G. Berryman, "Seismic velocity decrement ratios for regions of partial melt in the lower mantle," *Geophys. Res. Lett.* **27**, 421–424 (2000). (Also, LLNL UCRL-JC-134866 Rev. 1, September, 1999.)

58. J. G. Berryman, P. A. Berge, and B. P. Bonner, "Transformation of seismic velocity data to extract porosity and saturation values for rocks," *J. Acoust. Soc. Am.* **107**, 3018–3027 (2000). (Also, Stanford Exploration Project Report **SEP-103**, May, 2000, pp. 331–348.) (Also, LLNL UCRL-JC-136703, November, 1999.)

59. J. G. Berryman and H. F. Wang, "Dispersion in poroelastic systems," *Phys. Rev. E* **64** (1), 011303-1–011303-16 (June 14, 2001). (Also, LLNL UCRL-JC-140001, October, 2000.)

60. S. R. Pride, E. Tromeur, and J. G. Berryman, "Biot slow-wave effects in stratified rock," *Geophysics* **67**, 271–281 (2002). (Published electronically August 20, 2001.)

(Also, LLNL UCRL-JC-139829, July, 2000.)

61. J. G. Berryman, P. A. Berge, and B. P. Bonner, "Estimating rock porosity and fluid saturation using only seismic velocities," *Geophysics* **67** (2), 391–404 (2002). (Also, LLNL UCRL-JC-135507 Revision 1, January, 2000.)

62. J. G. Berryman, "Extension of poroelastic analysis to double-porosity materials: New technique in microgeomechanics," *ASCE Journal of Engineering Mechanics* **128**, 840–847 (2002). (Also, Stanford Exploration Project Sponsors' Report, SEP-111, April, 2002, pp. 269-291.) (Also, LLNL UCRL-JC-146100, October, 2001.)

63. J. G. Berryman and S. R. Pride, "Models for computing geomechanical constants of double-porosity materials from the constituents' properties," *J. Geophys. Res.* **107** (B3), 10.1029/2000JB000108, March 28, 2002. (Also, LLNL UCRL-JC-141592, December, 2000.)

64. S. R. Pride, J. G. Berryman, and J. M. Harris, "Seismic attenuation due to wave-induced flow," *J. Geophys. Res.* **109**, B01201 (January 14, 2004). (Also, LLNL UCRL-JC-153978, July 16, 2003.) (Also, LLNL UCRL-JP-200391, October 20, 2003.) (Also, Stanford Exploration Project Sponsors' Report **SEP-114**, pp. 249–282, October, 2003.)

65. J. G. Berryman and S. R. Pride, "Dispersion of waves in porous cylinders with patchy saturation: Formulation and torsional waves," *J. Acoust. Soc. Am.* **117**, 1785–1795 (2005). (Also, LLNL UCRL-JRNL-205634, July 30, 2004.)

66. J. G. Berryman, "Pore fluid effects on shear modulus in a model of heterogeneous rocks, reservoirs, and granular media," *J. Geophys. Res.* **110** (B7), B07202 (online: July 20, 2005). (Also, LLNL UCRL-JRNL-210754, March 23, 2005.)

J. G. Berryman, "Estimates and rigorous bounds on pore-fluid enhanced shear modulus in poroelastic media with hard and soft anisotropy," *International Journal of Damage Mechanics*, accepted for publication, to appear April, 2006. (Also, LLNL UCRL-JRNL-209252, January 27, 2005.)

J. G. Berryman, "Effective medium theories for multicomponent poroelastic composites," *ASCE J. Engineering Mech.*, accepted for publication, to appear May, 2006. (Also, LLNL UCRL-JRNL-209616, February 11, 2005.)

J. G. Berryman, "Seismic waves in rocks with fluids and fractures," UCRL-PROC-218714, February 7, 2006. Also, viewgraphs: "Seismic wave propagation in rocks with fluids and fractures," UCRL-PRES-219065, February 16, 2006.

Internal Reports : LLNL and Stanford

L. Thigpen and J. G. Berryman, "Compaction of liquid saturated and partially liquid

saturated porous geologic solids," LLNL UCRL-97509, October, 1987.

J. G. Berryman, P. A. Berge, and B. P. Bonner, "Role of Lamé λ in estimating porosity and saturation from seismic velocities," LLNL preprint UCRL-JC-133587, March, 1999.

J. G. Berryman, P. A. Berge, and B. P. Bonner, "Estimating rock porosity and fluid saturation using only seismic velocities," Stanford Exploration Project Report **SEP-102**, October, 1999, pp. 143-156. (Also, LLNL UCRL-JC-135507, August, 1999.)

P. A. Berge, B. P. Bonner, J. J. Roberts, D. Wildenschild, C. M. Aracne Ruddle, J. G. Berryman, H. Bertete-Aguirre, C. O. Boro, and E. D. Carlberg, "EMSP Project #7010: Effects of fluid distribution on measured geophysical properties for partially saturated, shallow subsurface conditions," LLNL UCRL-ID-137130 abs, August 3, 2000.

J. G. Berryman, "Effects of pressure and saturation on seismic velocities and impedance measurements," LLNL UCRL-ID-142041, January, 2001.

P. A. Berge, B. P. Bonner, J. J. Roberts, D. Wildenschild, C. M. Aracne-Ruddle, J. G. Berryman, H. Bertete-Aguirre, et al., "FY2001 Annual Report for EMSP Project #70108: Effects of fluid distribution on measured geophysical properties for partially saturated, shallow subsurface conditions," LLNL UCRL-ID-144288, June 14, 2001.

P. A. Berge, B. P. Bonner, J. J. Roberts, D. Wildenschild, J. G. Berryman and H. Bertete-Aguirre, "Effects of fluid distribution on measured properties for partially saturated, shallow subsurface conditions," LLNL UCRL-JC-145937, November 1, 2001.

P. A. Berge, B. P. Bonner, J. J. Roberts, D. Wildenschild, C. M. Aracne-Ruddle, J. G. Berryman, H. Bertete-Aguirre, et al., "FY2002 Final Report for EMSP Project #70108: Effects of fluid distribution on measured geophysical properties for partially saturated, shallow subsurface conditions," LLNL UCRL-ID-148954, June 11, 2002.

J. G. Berryman and S. R. Pride, "Dispersion of waves in porous cylinders with patchy saturation," Stanford Exploration Project Sponsors' Report, SEP-112, September, 2002, pp. 237–258. (Also, LLNL UCRL-JC-150358, October 3, 2002.)

Talks at Conferences

B. P. Bonner, P. B. Nagy, Q. Xue, L. Adler, and J. Berryman, "Biot's slow wave in Massilon and Berea sandstones," expanded abstract and contributed talk at SEG annual meeting, Sept. 23–27, 1990, San Francisco, CA, RP1.4, pp. 794–796.

J. G. Berryman, "Coherent potential approximation for Biot's equations and generalized Gassmann's equations," invited talk at the Acoustical Society of America meeting in San Diego, CA, November 29, 1990.

J. G. Berryman, "Using single-scattering approximations to generalize Gassmann's equation," _Bull. Am. Phys. Soc._ **37**, 398 (1992); abstract of talk given at the American

Physical Society March Meeting, Indianapolis, IN, March 16–20, 1992.

P. A. Berge, B. P. Bonner, and J. G. Berryman, "Observed seismic velocity-porosity relationships for synthetic sandstones," abstract for talk at 1992 AGU Fall Meeting, San Francisco, CA, December 7-11, 1992.

B. P. Bonner, P. A. Berge, J. G. Berryman, and H. F. Wang, "Poroelasticity of rock," talk at OBES Workshop on Rock Fracture, Albuquerque, NM; LLNL UCRL-JC-113806, May 13, 1993.

J. G. Berryman and H. F. Wang, "Multiscale elasticity: Wave propagation and attenuation in a double-porosity dual-permeability medium," talk presented at the Fifth SIAM Conference on Mathematical and Computational Issues in the Geosciences, San Antonio, Texas, March 24–27, 1999.

J. G. Berryman, P. A. Berge, and B. P. Bonner, "Role of λ-diagrams in estimating porosity and saturation from seismic velocities," talk and extended abstract, SEG Sixty-Ninth Annual Meeting, Houston, Texas, October 31 – November 5, 1999, Vol. I, pp. 176–179. (Also, LLNL preprint UCRL-JC-134224, May, 1999.)

J. G. Berryman, "Seismic velocity decrement ratios for regions of partial melt near the core-mantle boundary," AGU Fall Meeting, San Francisco, CA, December, 1999. (Also, Stanford Exploration Project Report **SEP-102**, October, 1999, pp. 193–200.) (Also, LLNL UCRL-JC-134866, July, 1999.)

J. G. Berryman, "Poroelasticity of rocks," talk at the Symposium on Fundamentals of Geophysical Imaging, to be held at Gaithersburg, Maryland, February 18–19, 2000, UCRL-JC-137076 abs, January, 2000.

J. G. Berryman, "Microgeomechanics," invited talk and paper at the Symposium on "Driving Forces of Micromechanics" at the ASCE/ASME/SES-Mechanics Conference in San Diego, CA (June 27–29, 2001). (UCRL-JC-141146-REV-1, November, 2000.)

J. G. Berryman and S. R. Pride, "Dispersion of extensional and torsional waves in porous cylinders with patchy saturation," talk and paper in *Poromechanics II*, J.-L. Auriault, C. Geindreau, P. Royer, J.-F. Bloch, C. Boutin, and J. Lewandowska (eds.), Proceedings of the 2nd Biot Conference on Poromechanics, Grenoble, France, August 26–28, 2002, pp. 613–618. (Also, LLNL UCRL-JC-147722, March 28, 2002.)

S. R. Pride and J. G. Berryman, "Attenuation of P-waves by wave-induced fluid flow," talk and paper in *Poromechanics II*, J.-L. Auriault, C. Geindreau, P. Royer, J.-F. Bloch, C. Boutin, and J. Lewandowska (eds.), Proceedings of the 2nd Biot Conference on Poromechanics, Grenoble, France, August 26–28, 2002, pp. 775–781. (Also, LLNL UCRL-JC-147806, April 8, 2002.)

H. F. Wang and J. G. Berryman, "Constitutive theory for velocity dispersion in rock

with dual porosity," talk and paper in *Poromechanics II*, J.-L. Auriault, C. Geindreau, P. Royer, J.-F. Bloch, C. Boutin, and J. Lewandowska (eds.), Proceedings of the 2nd Biot Conference on Poromechanics, Grenoble, France, August 26–28, 2002, pp. 851–856. (Also, LLNL UCRL-JC-147809, April 8, 2002.)

J. G. Berryman, "Scale-up in poroelastic systems and applications to reservoirs," in Proceedings of the 16th ASCE Engineering Mechanics Conference, University of Washington, Seattle, WA, July 16–18, 2003. (Also, LLNL UCRL-JC-153933, July 10, 2003.)

J. G. Berryman, "Up-scaling analysis with rigorous error estimates for poromechanics in random polycrystals of porous laminates," paper and talk at the Third Biot Conference on Poromechanics, University of Oklahoma, Norman, Oklahoma, May 24–27, 2005. (Also, LLNL UCRL-PROC-208970, January 13, 2005.) (Also, LLNL UCRL-PRES-211880, May 2, 2005.)

J. G. Berryman, "Poromechanics of reservoirs estimated for the random polycrystals of porous laminates model," talk at the McMat2005 Joint Conference on Mechanics and Materials, Symposium (100.1) on Particle-Scale Behavior for Granular Systems: Experiments and Model Validation, Baton Rouge, Louisiana, June 1–3, 2005. (Also, LLNL UCRL-PRES-212243, May 13, 2005.)

J. G. Berryman, "Biot Lecture: Twenty-five years of the slow wave," talk at the Third Biot Conference on Poromechanics, University of Oklahoma, Norman, Oklahoma, May 24–27, 2005. (Also, LLNL UCRL-PRES-212378, May 18, 2005.)

J. G. Berryman, "Role of double-porosity dual-permeability models for multi-resonance geomechanical systems," to appear in Proceedings of Rainbow in the Earth, 2nd International Workshop 2005, Lawrence Berkeley National Laboratory, Berkeley, CA, August 17–18, 2005. (Also, LLNL UCRL-PROC-212413, May 19, 2005.)

TRANSPORT IN POROUS MEDIA

Papers

65. J. G. Berryman, "Computing variational bounds for flow through random aggregates of spheres," *J. Comput. Phys.* **52**, 142-162 (1983). (Also, LLNL UCRL-88354, November, 1982.)

66. J. G. Berryman, "Bounds on fluid permeability for viscous flow through porous media," *J. Chem. Phys.* **82**, 1459-1467 (1985). (Also, LLNL UCRL-90929, June, 1984 and *Bull. Am. Phys. Soc.* **29**, 1558 (1984).)

67. J. G. Berryman, "Variational bounds on Darcy's constant," in *Homogenization and Effective Moduli of Materials and Media*, edited by J. L. Ericksen, D. Kinderlehrer, R. Kohn, and J.-L. Lions, Proceedings of the Workshop on Homogenization and Effective Moduli of Materials and Media, Institute for Mathematics and Its Applications,

University of Minnesota, Minneapolis, MN, October 22-26, 1984, (Springer-Verlag, New York, 1986), pp. 52–77. (Also, LLNL UCRL-91882, February, 1985.) **MR 87j:76084/87i:73006**

68. J. G. Berryman and G. W. Milton, "Normalization constraint for variational bounds on fluid permeability," *J. Chem. Phys.* **83**, 754–760 (1985). (Also, LLNL UCRL-92239, February, 1985.)

*69. J. G. Berryman and S. C. Blair, "Use of digital image analysis to estimate fluid permeability of porous materials I. Application of two-point correlation functions," *J. Appl. Phys.* **60**, 1930–1938 (1986). (Also, LLNL UCRL-94309, March, 1986.)

70. J. G. Berryman, "Relationship between specific surface area and spatial correlation functions for anisotropic porous media," *J. Math. Phys.* **28**, 244-245 (1987). (Also, LLNL UCRL-94573, May, 1986.) **MR 88b:82059**

71. J. G. Berryman and S. C. Blair, "Kozeny-Carman relations and image processing methods for estimating Darcy's constant," *J. Appl. Phys.* **62**, 2221-2228 (1987). (Also, LLNL UCRL-95305, September, 1986.)

72. S. C. Blair and J. G. Berryman, "Permeability and relative permeability in rocks," in *Fault Mechanics and Transport Properties in Rocks*, Proceedings of the Brace Symposium, MIT, June 10-11, 1990, Cambridge, MA, B. Evans and T.-f. Wong (eds.), Academic Press, London, 1992, Chapter 7, pp. 169–186. (Also, LLNL UCRL-JC-105242, October, 1990.)

73. S. C. Blair and J. G. Berryman, "Estimates of permeability and relative permeability for sandstone using image analysis of cross sections," in *Rock Mechanics as a Multidisciplinary Science*, Proceedings of the 32nd U. S. Symposium, Norman, Oklahoma, July 10–12, 1991, J.-C. Roegiers (ed.), Balkema, Rotterdam, 1991, pp. 365–374.

74. J. G. Berryman, "Exact effective-stress rules in rock mechanics," *Phys. Rev. A* **46**, 3307–3311 (1992). (Also, LLNL UCRL-JC-109647, February, 1992.)

75. J. G. Berryman, "Mechanics of inhomogeneous rock: The two-constituent porous medium paradigm," in *Macroscopic Behavior of Heterogeneous Materials from the Microstructure*, edited by S. Torquato and D. Krajcinovic, *Proceedings of the Symposium on Macroscopic Behavior of Heterogeneous Materials from Microstructure*, ASME Winter Annual Meeting, Anaheim, CA, November 8–13, 1992 (ASME, New York, 1992), pp. 27–38. (Also, LLNL UCRL-JC-109631, February, 1992.)

76. J. G. Berryman, "Effective stress for transport properties of inhomogeneous porous rock," *J. Geophys. Res.* **97**, 17409–17424 (1992). (Also, LLNL UCRL-JC-109655, February, 1992.)

77. J. G. Berryman, "Effective-stress rules for pore-fluid transport in rocks containing two

minerals," *Int. J. Rock Mech. Min. Sci. & Geomech. Abst.* **30**, 1165–1168 (1993); also, in *Proceedings of the 34th U. S. Symposium on Rock Mechanics*, June 27–30, 1993, University of Wisconsin – Madison, Vol. II, pp. 561–564. (Also, LLNL UCRL-JC-111654, January, 1993.)

78. S. C. Blair, P. A. Berge, and J. G. Berryman, "Estimates of permeability of porous materials using image analysis of cross sections," in *Digital Image Processing: Techniques and Applications in Civil Engineering*, J. D. Frost and J. R. Wright (eds.), Proceedings of the Engineering Foundations Conference, Kona, HI, 1993 (Am. Soc. Civ. Eng., New York, 1993), pp. 109–116.

79. J. G. Berryman and H. F. Wang, "The elastic coefficients of double-porosity models for fluid transport in jointed rock," *J. Geophys. Res.* **100** (B12), 24611–24627 (1995). (Also, LLNL UCRL-JC-119722, January, 1995.)

80. H. F. Wang and J. G. Berryman, "On constitutive equations and effective stress for deformable, double porosity media," *Water Resources Res.* **32**, 3621–3622 (1996). (Also, LLNL UCRL-JC-124051, April, 1996.)

81. S. C. Blair, P. A. Berge, and J. G. Berryman, "Using two-point correlation functions to characterize microgeometry and estimate permeabilities of sandstones and porous glass," *J. Geophys. Res.* **101**, 20359–20375 (1996); "Reply" (to comment), *J. Geophys. Res.* **102**, 24813 (1997). (Also, LLNL UCRL-JC-114181 Rev. 1, June, 1993.)

82. P. A. Berge, J. G. Berryman, S. C. Blair, and C. Peña, "Scalar properties of transversely isotropic tuff from images of orthogonal cross sections," in *Imaging Technologies: Techniques and Applications in Civil Engineering*, edited by J. D. Frost and S. McNeil, *Proceedings of the Second International Conference*, Davos, Switzerland, May 25–30, 1997 (ASCE, Reston, Virginia, 1998), pp. 185–196. (Also, LLNL UCRL-JC-126396, January, 1997.)

83. J. G. Berryman, "Planar spatial correlations, anisotropy, and specific surface area of stationary random porous media," *J. Appl. Phys.* **83** , 1685–1693 (1998). (Also, LLNL preprint UCRL-JC-128482, September, 1997.)

84. J. G. Berryman and H. F. Wang, "Double porosity modeling in elastic wave propagation for reservoir characterization," in *Mathematical Methods in Geophysical Imaging V*, edited by S. Hassanzadeh, SPIE Vol. 3453, Proceedings of the SPIE symposium on Mathematical Methods in Geophysical Imaging, July 20–21, 1998, San Diego, CA (SPIE, Bellingham, Washington, 1998), pp. 58–69. (Also, Stanford Exploration Project Sponsor's Report **SEP-98**, June, 1998, pp. 223–242.) (Also, LLNL UCRL-JC-131020, June, 1998.)

85. H. F. Wang, J. G. Berryman, and P. A. Berge, "Estimates of frequency-dependent

compressiblity from a quasistatic double-porosity model," extended abstract for *International Symposium* appearing in **Dynamics of Fluids in Fractured Rocks: Concepts and Recent Advances**, LBNL, Berkeley, California, February 10-12, 1999. (LLNL UCRL-JC-132013, September, 1998.)

86. J. G. Berryman and H. F. Wang, "Elastic wave propagation and attenuation in a double-porosity dual-permeability medium," in *Proceedings of the Neville G. W. Cook Conference, LBNL, October 16–17, 1998, Int. J. Rock Mech.* **37**, 63–78 (2000). (Also, Stanford Exploration Project Sponsor Report **SEP-100**, May, 1999, pp. 335–360.) (Also, LLNL UCRL-JC-132136, October, 1998.)

87. S. R. Pride and J. G. Berryman, "Linear dynamics of double-porosity dual-permeability materials. I. Governing equations and acoustic attenuation," *Physical Review E* **68**, 036603 (September 9, 2003). (Also, LLNL UCRL-JC-150241-PT-1, December, 2002.)

88. S. R. Pride and J. G. Berryman, "Linear dynamics of double-porosity dual-permeability materials. II. Fluid transport equations," *Physical Review E* **68**, 036604 (September 9, 2003). (Also, LLNL UCRL-JC-150241-PT-2, December, 2002.)

89. J. G. Berryman, "Electrokinetic effects and fluid permeability," *Physica B* **338**, 270–273 (2003). (Also, LLNL UCRL-JC-148809, June 27, 2002.)

90. J. G. Berryman, "Thermal conductivity of porous media," *Appl. Phys. Lett.* **86**, 032905 (online: January 11, 2005). (Also, LLNL UCRL-JRNL-206118, August 19, 2004.)

91. J. G. Berryman, "Bounds and estimates for transport coefficients of random and porous media with high contrasts," *J. Appl. Phys.* **97**(6), 063504 (online: March 1, 2005). (online: 2005). (Also, LLNL UCRL-JRNL-206888, September 30, 2004.)

92. J. G. Berryman, "Comparison of up-scaling methods in poroelasticity and its generalizations," *ASCE J. Engineering Mechanics* **131**(9), 928–936 (2005). (Also, LLNL UCRL-JRNL-204710, June 15, 2004.) (Also, for talk: LLNL UCRL-PROC-202969, March 17, 2004.) (Also, LLNL UCRL-PROC-201487, December 16, 2003.)

93. J. G. Berryman, "Geomechanical analysis with rigorous error estimates for a double-porosity reservoir model," *Int. J. Num. Anal. Methods Geomech.* , to appear March 25, 2006 (online: December 8, 2005). (Also, LLNL UCRL-JRNL-211303, April 12, 2005.) (Also, Stanford Exploration Project Sponsor Report **SEP-123**, November, 2005, pp. 161–174.)

LLNL and Stanford Reports

S. R. Pride, J. M. Harris, D. L. Johnson, A. Mateeva, K. T. Nihei, R. L. Nowack, J. W. Rector, H. Spetzler, R. Wu, T. Yamamoto, J. G. Berryman, and M. Fehler, "Per-

meability dependence of seismic amplitudes," *The Leading Edge* **22**, 518–525 (2003). (Also, UCRL-JC-151489, January 23, 2003.)

J. G. Berryman, "Dynamic permeability in poroelasticity," LLNL UCRL-JC-152477, March 24, 2003. (Also, Stanford Exploration Project Sponsor Report **SEP-113**, May, 2003, pp. 443–454.)

Talks at Conferences and Meetings

J. G. Berryman, S. C. Blair, and B. P. Bonner, "Estimates of permeability from digital images of a porous material," talk given at the *Thirty-Eighth Meeting of the American Physical Society, Division of Fluid Dynamics, Tucson, Arizona, November 24–26, 1985.* (Also, LLNL UCRL-93107 ABST, July, 1985.)

S. C. Blair, J. G. Berryman, and B. P. Bonner, "Predicting permeability in sandstones using image processing techniques," *EOS, Trans. Amer. Geophysical Union* **66**, 1094 (1985), talk given at the fall meeting of Amer. Geophysical Union in San Francisco, CA, December 9–13, 1985.

J. G. Berryman and S. C. Blair, "Estimates of sandstone permeability from digital image processing," talk given at the fall AGU meeting in San Francisco, CA, December 8-12, 1986. (Also, LLNL UCRL-95280, August, 1986.)

J. G. Berryman, "Microgeometry of porous media," invited talk given at the Gordon Research Conference on Modeling of Fluid Flow in Permeable Media, Plymouth State College, Plymouth, NH, August 15-19, 1988.

J. G. Berryman and S. C. Blair, "Permeability and relative permeability," invited talk at the Brace Symposium, MIT, June 10-11, 1990.

B. P. Bonner, P. B. Nagy, S. E. Benson, J. G. Berryman, and L. Adler, "The acoustic microstructure of porous rocks," Permeability and Fluid Pressure Workshop (SEG), August 5–8, 1990, Denver, Colorado.

S. C. Blair, J. G. Berryman, and D. Agrawal, "Estimates of hydraulic properties including relative permeability, for Berea sandstone determined using image processing techniques," presented at AGU Fall Meeting, December, 1990, San Francisco, CA.

S. C. Blair and J. G. Berryman, "Estimates of permeability and relative permeability for sandstone using image analysis of cross sections," presented at the 32nd US ROck Mechanics Symposium, Norman, Oklahoma, July 10–12, 1991. (Also, UCRL-JC-106023-REV-1, March, 1991.)

J. G. Berryman, "Exact generalizations of Gassmann's equation and effective stress for inhomogeneous porous media," poster presentation given at the Gordon Research Conference on Modeling of Fluid Flow in Permeable Media, Plymouth State College, Plymouth, NH, August 10–14, 1992.

J. G. Berryman, "Exact effective-stress rules in inhomogeneous rocks," invited talk, 1992 American Geophysical Union Fall Meeting, San Francisco, CA, December 7–11, 1992.

J. G. Berryman, "Exact effective-stress rules for transport in porous media," talk given at SIAM Conference on Mathematical and Computational Issues in the Geosciences, Houston, TX, April 19–21, 1993.

J. G. Berryman, "History of Gassmann's contribution to poroelasticity," invited talk at AGU 1993 Fall Meeting, San Francisco, CA, December 6–10, 1993.

J. G. Berryman and H. F. Wang, "Mechanics of double-porosity models for fluid transport in jointed rock," talk at AGU 1994 Fall Meeting, San Francisco, CA, December 5–9, 1994. (Also, LLNL UCRL-JC-119148, December, 1994.)

J. G. Berryman, "Role of rock physics in reservoir characterization," talk at Third SIAM Conference on Mathematical and Computational Issues in the Geosciences, San Antonio, Texas, February 8–10, 1995.

J. G. Berryman and S. R. Pride, "Equations of motion for isotropic porous media with multiple solid constituents," in *Stanford Exploration Project Report* **89**, 73–87 (1995). (Also, LLNL UCRL-JC-124052, April, 1996.)

J. G. Berryman, E. J. Garboczi, and N. Martys, "Correcting digitization bias for estimating fluid permeability of porous media from images," oral presentation at the American Physics Society, Division of Fluid Dynamics 50th Annual Meeting, San Francisco, California, November 23–25, 1997. (Also, LLNL UCRL-JC-128217 abs, August, 1997.)

J. G. Berryman, "Electrokinetic effects and fluid permeability," invited talk and paper at the Sixth International Conference on the Electromagnetic and Optical Properties of Inhomogeneous Media (ETOPIM 6), Salt Lake City, Utah, July 15–19, 2002. Appeared online in *Physica B*, October 14, 2003. (Also, LLNL UCRL-JC-148809, June 27, 2002.)

J. G. Berryman, "Scale-Up in Poroelastic Systems and Applications to Reservoirs," paper and talk at the ASCE EM2003 Conference in Seattle, Washington, July 16–18, 2003. (Also, LLNL UCRL-JC-153933, July 10, 2003.) (Also, Stanford Exploration Project Sponsors' Report **SEP-114**, pp. 237–248, October, 2003.)

J. G. Berryman, "Multi-scale modeling and imaging in reservoirs," talk presented at the University of Petroleum, Beijing, China, November 20–21, 2003. (Also, UCRL-PRES-200572, October 27, 2003.)

J. G. Berryman, "Introduction to dispersion in poroelastic systems," talk presented at the University of Petroleum, Beijing, China, November 20–21, 2003. (Also, UCRL-PRES-200576, October 27, 2003.)

J. G. Berryman, "Electrokinetics and fluid permeability," talk presented at the University of Petroleum, Beijing, China, November 20–21, 2003. (Also, UCRL-PRES-200879, November 11, 2003.)

J. G. Berryman, "Poroelasticity," talk presented at the University of Petroleum, Beijing, China, November 20–21, 2003. (Also, UCRL-PRES-201595, December 23, 2003.)

J. G. Berryman, "Comparison of two up-scaling methods in poroelasticity and its generalizations," conference proceedings paper in Proceedings of the 17th ASCE Engineering Mechanics Conference, June 13–16, 2004, University of Delaware, Newark, Delaware, Paper No. 78. (Also, for talk: LLNL UCRL-PROC-202969, March 17, 2004.)

J. G. Berryman, "Comparison of up-scaling methods in poroelasticity and its generalizations," conference talk presented at the 17th ASCE Engineering Mechanics Conference, June 13–16, 2004, University of Delaware, Newark, Delaware. (Also, for viewgraphs: LLNL UCRL-CONF-204710, June 15, 2004.)

J. G. Berryman, "Up-scaling methods in poroelasticity and double-porosity geomechanics," invited talk at the 69th Annual Meeting of the Deutsche Physikalische Gesellschaft, Technical University, Berlin, March 7, 2005. (Also, for viewgraphs: LLNL UCRL-PRES-21004, February 25, 2005.)

94. H. F. Wang, T. E. Strand, and J. G. Berryman, "Percolation-continuum model of evaporative drying: Homogeneous or patchy saturation?" in *Dynamics of Fluids and Transport in Fractured Rock*, Geophysical Monograph Series 162, American Geophysical Union, 2005, pp. 43–54. Also, talk presented at the Second International Symposium on the Dynamics of Fluids in Fractured Rock, Berkeley, California, February 12, 2004. (Also, UCRL-PROC-210005, February 25, 2005.)

J. G. Berryman, "Bounds on transport coefficients of porous media," in *Proceedings of McMat2005*, 2005 Joint ASME/ASCE/SES Conference on Mechanics and Materials, Baton Rouge, Louisiana, USA, June 1–3, 2005. (Also, LLNL UCRL-PROC-210697, March 21, 2005.) (Also, LLNL UCRL-PRES-211919, May 3, 2005.)

J. G. Berryman, "Role of double-porosity dual-permeability models for multi-resonance geomechanical systems," *Rainbow in the Earth: Frequency-Dependent Geophysical Properties and Their Relationships to Rock Properties*, LBNL, Berkeley, CA, August 17–18. 2005. (Also, LLNL UCRL-PRES-214722, August 19, 2005.)

RANDOM COMPOSITES AND ROCKS

Papers

*95. J. G. Berryman, "Long-wave elastic anisotropy in transversely isotropic media," *Geophysics* **44**, 896-917 (1979); "Reply to K. Helbig," *Geophysics* **45**, 977-982 (1980);

"Reply to F. M. Lyakhovitskiy," *Geophysics* **46**, 336-339 (1981).

96. J. G. Berryman, "Theory of elastic properties of composite materials," *Appl. Phys. Lett.* **35**, 856–858 (1979).

97. J. G. Berryman, "Long-wavelength propagation in composite elastic media I. Spherical inclusions," *J. Acoust. Soc. Am.* **68, 1809–1819 (1980).

*98. J. G. Berryman, "Long-wavelength propagation in composite elastic media II. Ellipsoidal inclusions," *J. Acoust. Soc. Am.* **68**, 1820–1831 (1980). — **Reprinted in:** *Seismic and Acoustic Velocities in Reservoir Rocks*, Vol. 2, Theoretical and Model Studies, edited by Z. Wang and A. Nur (Society of Exploration Geophysicists, Tulsa, Oklahoma, 1992), pp. 285–296.

99. J. G. Berryman, "Effective medium theory for elastic composites," in *Elastic Wave Scattering and Propagation*, edited by V. K. Varadan and V. V. Varadan, Proceedings of the Specialty Symposium on Wave Propagation and Scattering, Midwestern Mechanics Conference XVII, May 6-8, 1981, University of Michigan at Ann Arbor (Ann Arbor Science, Ann Arbor, MI, 1982), Chapt. 7, pp. 111-129.

100. J. G. Berryman, "Variational bounds on elastic constants for the penetrable sphere model," *J. Phys. D: Appl. Phys.* **18**, 585-597 (1985). (Also, LLNL UCRL-91115, June, 1984.)

*101. J. G. Berryman, "Measurement of spatial correlation functions using image processing techniques," *J. Appl. Phys.* **57**, 2374-2384 (1985). (Also, LLNL UCRL-91275, July, 1984.)

102. B. P. Bonner, S. E. Benson, and J. G. Berryman, "Acoustic microscopy of rough surfaces," in *Multiple Scattering of Waves in Random Media and Random Rough Surfaces*, edited by V. V. Varadan and V. K. Varadan, *Proceedings of an International Symposium held at Pennsylvania State University, University Park, PA, July 29-August 2, 1985* (Pennsylvania State University, University Park, PA, 1987), pp. 671-678. (Also, LLNL UCRL-92422, July, 1985.)

103. J. G. Berryman, "Interpolating and integrating three-point correlation functions on a lattice," *J. Comput. Phys.* **75**, 86–102 (1988). (Also, LLNL UCRL-95954, January, 1987.)

104. J. G. Berryman and G. W. Milton, "Microgeometry of random composites and porous media," *J. Phys. D: Appl. Phys.* **21**, 87-94 (1988). (Also, LLNL UCRL-96257, April, 1987.)

105. J. G. Berryman, "Bounds on decay constants for diffusion through inhomogeneous media," *J. Phys. A: Gen. Phys.* **21**, 4423-4441 (1988). (Also, LLNL UCRL-97856,

December, 1987.) **MR 90a:35105**

106. J. G. Berryman, "Estimating effective moduli of composites using quantitative image analysis," in *Random Media and Composites*, edited by R. V. Kohn and G. W. Milton, *Proceedings of the SIAM Workshop on Random Media and Composites, Xerox Training Center, Leesburg, VA, December 7-10, 1988* (SIAM, Philadelphia, 1989), Chapter 1, pp. 3-12. (Also, LLNL UCRL-99493, April, 1989.)

107. J. G. Berryman, "Mixture theories for rock properties," *Rock Physics and Phase Relations: American Geophysical Union Handbook of Physical Constants*, edited by T. J. Ahrens (AGU, New York, 1995), pp. 205–228. (Also, LLNL UCRL-JC-109949, March, 1992; revised, November, 1992.)

108. J. G. Berryman, "Analysis of ultrasonic velocities in hydrocarbon mixtures," *J. Acoust. Soc. Am.* **93**, 2666-2668 (1993). (Also, LLNL UCRL-JC-111653, September, 1992; SEP-75, September, 1992, pp. 447–453.)

109. J. G. Berryman, "Role of porosity in estimates of composite elastic constants," in *Composite Material Technology 1993*, Proceedings of the Symposium on Composite Material Technology at the 16th Annual Energy-sources Technology Conference and Exhibition, Houston, Texas, January 31–February 4, 1993, edited by D. Hui, T. J. Kozik, and O. O. Ochoa (ASME, New York, 1993), pp. 223–235. Revised version in *Trans. ASME J. Energy Resources Tech.* **116**, 87–96 (1994). (Also, LLNL UCRL-JC-112024, October, 1992.)

110. J. G. Berryman and P. A. Berge, "Rock elastic properties: Dependence on microstructure," in *Homogenization and Constitutive Modeling for Heterogeneous Materials*, Proceedings of the Symposium on Homogenization and Constitutive Modeling for Heterogeneous Materials, University of Virginia, Charlottesville, Virginia, June 6–9, 1993, edited by C. S. Chang and J. W. Ju (ASME, New York, 1993), pp. 1-13. (Also, LLNL UCRL-JC-112854, February, 1993.)

111. P. A. Berge, B. P. Bonner, and J. G. Berryman, "Ultrasonic velocity-porosity relationships for sandstone analogs made from fused glass beads," *Geophysics* **60**, 108–119 (1995). (Also, LLNL UCRL-JC-113379, March, 1993.)

112. P. A. Berge, J. G. Berryman, and B. P. Bonner, "Influence of microstructure on rock elastic properties," *Geophys. Res. Lett.* **20**, 2619–2622 (1993). (Also, LLNL UCRL-JC-114738, August, 1993.)

113. P. A. Berge and J. G. Berryman, "Realizability of negative pore compressibility in poroelastic composites," *ASME J. Appl. Mech.* **62** (4), 1053–1062 (1995). (Also, LLNL UCRL-JC-116131, January, 1994.)

114. T. Mukerji, J. G. Berryman, G. Mavko, and P. A. Berge, "Differential effective medium

modeling of rock elastic moduli with critical porosity constraints," *Geophys. Res. Lett.* **22**, 555–558 (1995). (Also, LLNL UCRL-JC-118939, October, 1994.) (Also, Stanford Rock and Borehole Geophysics Project Annual Report, Volume 55 "B", August, 1994, paper F1.) (Also, talk at AGU 1994 Fall Meeting, San Francisco, CA, December 5–9, 1994.) — **Reprinted in:** *Seismic and Acoustic Velocities in Reservoir Rocks*, Vol. 3, Recent Developments, edited by Z. Wang and A. Nur (Society of Exploration Geophysicists, Tulsa, Oklahoma, 2000), pp. 279–282.

115. J. G. Berryman and P. A. Berge, "Critique of explicit schemes for estimating elastic properties of multiphase composites," *Mech. Materials* **22**, 149–164 (1996). (Also, LLNL UCRL-JC-120433, February, 1995.)

116. J. G. Berryman, "Generalization of Eshelby's formula for a single ellipsoidal elastic inclusion to poroelasticity and thermoelasticity," *Phys. Rev. Lett.* **79**, 1142–1145 (1997). (Also, LLNL UCRL-JC-126047, December, 1996.)

117. G. W. Milton and J. G. Berryman, "On the effective viscoelastic moduli of two-phase media. II. Rigorous bounds on the complex shear modulus in three dimensions," *Proc. Royal Soc. London A* **453**, 1849–1880 (1997). **MR1478137 (99h:73004)** (Also, LLNL UCRL-JC-124617, July, 1996.)

118. J. G. Berryman, V. Grechka, and P. A. Berge, "Analysis of Thomsen parameters for finely layered VTI media," *Geophysical Prospecting* **47**, 959–978 (1999). An earlier version appeared in *Stanford Exploration Project Report* **SEP-94**, 247–261 (1997). (Also, UCRL-JC-127249, April, 1997; UCRL-JC-127249 Rev. 1, March, 1998.)

119. J. G. Berryman, "Transversely isotropic poroelasticity arising from thin isotropic layers," in *Mathematics of Multiscale Materials*, IMA Volume 99, edited by K. M. Golden, G. R. Grimmett, R. D. James, G. W. Milton, and P. N. Sen, *Proceedings of the Workshop on Percolation and Random Media*, Institute for Mathematics and Its Applications, University of Minnesota, Minneapolis, Minnesota, November 12–16, 1995 (Springer-Verlag, New York, 1998), pp. 37–50. **MR1636007 (99e:73025)** (Also, LLNL preprint UCRL-JC-126017, December, 1996.)

120. L. V. Gibiansky, G. W. Milton, and J. G. Berryman, "On the effective viscoelastic moduli of two-phase media. III. Rigorous bounds on the complex shear modulus in two dimensions," *Proc. Royal Soc. London A* **455**, 2117–2149 (1999). **MR1702750 (2000e:74095)** (Also, LLNL UCRL-JC-130670, April, 1998.)

121. J. G. Berryman, S. R. Pride, and H. F. Wang, "A differential scheme for elastic properties of rocks with dry or saturated cracks," *Geophys. J. Int.* **151** (2), 597–611 (2002). (Also, LLNL UCRL-JC-143172, March, 2001.) (Also, Stanford Exploration Project Sponsors' Report SEP-108, April, 2001, pp. 173–198.)

122. J. G. Berryman, "Modeling high-frequency acoustic velocities in patchy and partially saturated porous rock using differential effective medium theory," *Int. J. Multiscale Computational Engineering* **2** (1), 115–131 (2004). (Also, UCRL-JC-148986, July 12, 2002.) (Also, Stanford Exploration Project Sponsors' Report SEP-112, September, 2002, pp. 223–236.)

123. J. G. Berryman, "Poroelastic shear modulus dependence on pore-fluid properties arising in a model of thin isotropic layers," *Geophys. J. Int.* **157** (1), 415–425 (2004). (Also, LLNL UCRL-JC-152285-REV-1, October 2, 2003.) (Also, Stanford Exploration Project Sponsors' Report **SEP-113**, May, 2003, pp. 455–478.)

124. J. G. Berryman, "Fluid effects on shear waves in finely layered porous media," *Geophysics* **70** (2), N1–N15 (2005). (Also, LLNL UCRL-JRNL-205498, July 26, 2004.) (Also, Stanford Exploration Project Sponsors' Report **SEP-115**, May, 2004, pp. 417–444.)

125. J. G. Berryman, "Poroelastic fluid effects on shear for rocks with soft anisotropy," *Geophysical J. International* **161** (3), 881–890 (online: May 5, 2005). (Also, LLNL UCRL-JRNL-203522, April 14, 2004.) (Also, Stanford Exploration Project Sponsors' Report **SEP-115**, May, 2004, pp. 445–466.)

126. J. G. Berryman, "Bounds on elastic constants for random polycrystals of laminates," *J. Appl. Phys.* **96** (8), 4281–4287 (2004). (Also, LLNL UCRL-JRNL-203971, May 4, 2004.)

127. J. G. Berryman, "Bounds and estimates for elastic constants of random polycrystals of laminates," *Int. J. Solids Structures* **42** (13), 3730–3743 (2005). (online: January 28, 2005). Also see Erratum: *Int. J. Solids Structures* **42**, 6711-6712 (2005). (online: June 6, 2005). (Also, LLNL UCRL-JRNL-206243, August 26, 2004.) (Also, for the Erratum, LLNL UCRL-JRNL-211882, May 2, 2005.)

128. J. G. Berryman, "Bounds and self-consistent estimates for elastic constants of random polycrystals with hexagonal, trigonal, and tetragonal symmetries," *J. Mech. Phys. Solids* **53**(10), 2141–2173 (online: July 5, 2005). (Also, LLNL UCRL-JRNL-206669, September 21, 2004.)

129. J. G. Berryman, "Measures of microstructure to improve estimates and bounds on elastic constants and transport coefficients in heterogeneous media," *Mech. Materials*, to appear early in 2006 (published online: November 30, 2005). (Also, LLNL UCRL-JRNL-207118, October 8, 2004.)

J. G. Berryman, "Up-scaling of elastic symmetry for heterogeneous laminates of crystals," LLNL UCRL-JRNL-206818, September 27, 2004.

Internal Reports : LLNL

S. C. Blair, P. A. Berge, and J. G. Berryman, "Two-point correlation functions to characterize microgeometry and estimate permeabilities of synthetic and natural sandstones," LLNL UCRL-LR-114182, August, 1993.

Internal Reports : *Stanford and LLNL*

J. G. Berryman, "Explicit schemes for estimating elastic properties of multiphase composites," *Stanford Exploration Project Sponsors' Report* **SEP-79**, August, 1993. (Also, LLNL UCRL-JC-114735, August, 1993.)

J. G. Berryman, "Range of the P-wave anisotropy parameter for finely layered VTI media," *Stanford Exploration Project Sponsors' Report* **SEP-93**, October, 1996. (Also, LLNL UCRL-JC-125589, October, 1996.)

J. G. Berryman, "Bounds on transport coefficients of porous media," *Stanford Exploration Project Sponsors' Report* **SEP-117**, September, 2004, pp. 151–158.

J. G. Berryman, "Bounds on geomechanical constants for a model of heterogeneous reservoirs," *Stanford Exploration Project Sponsors' Report* **SEP-117**, September, 2004, pp. 159–173.

J. G. Berryman, "Using knowledge of microstructure to improve estimates and bounds on elastic constants and transport coefficients in heterogeneous media," *Stanford Exploration Project Sponsors' Report* **SEP-120**, May, 2005, pp. 407–438.

J. G. Berryman, "Geomechanical constants of heterogeneous reservoirs: Pore fluid effects on shear modulus," *Stanford Exploration Project Sponsors' Report* **SEP-120**, May, 2005, pp. 439–470.

Talks at Conferences and Symposia

P. A. Berge, B. P. Bonner, and J. G. Berryman, "Microgeometry and elastic properties of porous glasses," invited talk at SEG Workshop on Dynamic Equivalent Medium Theories and their Experimental Verification, Washington, D. C., October 1, 1993.

P. A. Berge, B. P. Bonner, C. Aracne-Ruddle, C. Trombino, and J. G. Berryman, "Compressional and shear wave velocities of soils at low pressures – Theoretical estimates and comparison of laboratory and field data," abstract submitted to the Seismological Society of America 94th Annual Meeting, Seattle, WA, May 3–5, 1999.

J. G. Berryman and P. A. Berge, "Mixture theories for anisotropic poroelasticity with application to estimating effects of partial melt on seismic velocities," abstract and talk for the Seismological Society of America 94th Annual Meeting, Seattle, WA, May 3–5, 1999. (Also, LLNL UCRL-JC-133210-ABS, February 3, 1999.)

P. A. Berge and J. G. Berryman, "Characterization of fluids and fractures in anisotropic formations," talk at the Fundamentals of Geophysical Imaging Research Symposium, Gaithersburg, Maryland, February 25–26, 2000 (LLNL-JC-137001abs, February, 2000).

J. G. Berryman, S. R. Pride, and H. F. Wang, "A differential scheme for elastic properties of rocks with dry or saturated cracks," poster at the American Geophysical Union Fall Meeting, San Francisco, California, December 9–14, 2001.

J. G. Berryman, S. R. Pride, and H. F. Wang, "A differential scheme for elastic properties of rocks with dry or saturated cracks," talk at the 15th ASCE Engineering Mechanics Division Conference, Columbia University, New York, New York, June 2–5, 2002.

J. G. Berryman, "Poroelastic analysis of Thomsen parameters for seismic waves in finely layered VTI media," paper and talk at SEG Annual Meeting in Dallas, October, 2003. (Also, LLNL UCRL-JC-152476, March 24, 2003.) (Also, LLNL UCRL-CONF-200773, November 5, 2003.)

Conference Proceedings

J. G. Berryman, "Transversely isotropic elasticity and poroelasticity arising from thin isotropic layers," in *Theoretical and Computational Acoustics '97*, edited by Y.-C. Teng, E.-C. Shang, Y.-H. Pao, M. H. Schultz, and A. D. Pierce, Proceedings of the International Conference on Theoretical and Computational Acoustics, Holiday Inn North, Newark, NJ, July 14–18, 1997 (World Scientific, Singapore, 1999), pp. 457–474. (Also, LLNL UCRL-JC-128121, July, 1997.)

J. G. Berryman, "Pore fluid effects on shear modulus for sandstones with soft anisotropy," in *Proceedings of the 2004 International Mechanical Engineeering Congress & Exposition*, Anaheim, CA, USA, November 13–19, 2004, IMECE2004-61565. (CD only) (Also, LLNL UCRL-PROC-203586, April 16, 2004.)

INVERSE PROBLEMS: SEISMIC AND ELECTRICAL

Papers

130. J. G. Berryman, "Choice of operator length for maximum entropy spectral analysis," *Geophysics* **43**, 1384–1391 (1978).

131. J. G. Berryman and R. R. Greene, "Discrete inverse scattering theory and the continuum limit," *Phys. Lett. A* **65**, 13–15 (1978). **MR 57:2267**

132. J. G. Berryman, "Floquet exponent for instability intervals of Hill's equation," *Commun. Pure Appl. Math.* **32**, 113–120 (1979). **MR 58:17305**

133. J. G. Berryman, "Inverse methods for elastic waves in stratified media," *J. Appl. Phys.* **50**, 6742–6744 (1979).

*134. J. G. Berryman and R. R. Greene, "Discrete inverse methods for elastic waves in layered media," *Geophysics* **45**, 213–233 (1980).

135. J. G. Berryman, "Weighted least-squares criteria for seismic traveltime tomography," *IEEE Trans. Geosci. Remote Sensing* **27**, 302–309 (1989). (Also, LLNL UCRL-98153, February, 1988.)

136. J. G. Berryman, "Traveltime tomography and nonlinear constrained optimization," invited paper in the Proceedings of the Twenty-Second Annual Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, Oct. 31–Nov. 2, 1988 (Maple Press, San Jose, CA, 1989), Vol. 1, pp. 54–57. (Also, LLNL UCRL-99831, October, 1988.)

137. J. G. Berryman, "Fermat's principle and nonlinear traveltime tomography," *Phys. Rev. Lett.* **62**, 2953–2956 (1989). (Also, LLNL UCRL-100635, March, 1989.) **MR 90c:86005**

138. J. G. Berryman, "Stable iterative reconstruction algorithm for nonlinear traveltime tomography," *Inverse Problems* **6**, 21–42 (1990). (Also, LLNL UCRL-100787, March, 1989.) **MR 91b: 00018**

139. James G. Berryman, "Convexity properties of inverse problems with variational constraints," *J. Franklin Inst.* **328**, 1–13 (1991). **MR1083656 (91m:49039)** (Also, LLNL UCRL-102299, November, 1989.)

140. J. G. Berryman, "Seismic crosshole tomography and nonlinear constrained optimization," in *Geophysical Inversion*, J. B. Bednar, L. R. Lines, R. H. Stolt, and A. B. Weglein (eds.), Proceedings in Applied Mathematics **52**, *Proceedings of the SIAM Workshop on Geophysical Inversion*, September 27–28, 1989, Houston, Texas, (SIAM, Philadelphia, 1992), Chapter 19, pp. 396–414. (Also, LLNL UCRL-102684, January, 1990.)

141. J. G. Berryman, "Inversion with variational constraints," in *Proceedings of the IEEE Geosciences and Remote Sensing Society Symposium, College Park, Maryland, May 20-24, 1990* (IEEE, New York, 1990), Vol. I, pp. 383-386. (Also, LLNL UCRL-102820, February, 1990.)

142. J. G. Berryman and R. V. Kohn, "Variational constraints for electrical impedance tomography," *Phys. Rev. Lett.* **65**, 325–328 (1990).

143. Shin-yee Lu and James G. Berryman, "Inverse scattering, seismic traveltime tomography, and neural networks," *Intern. J. Imaging Sys. Tech.* **2**, 112–118 (1991). (Also, LLNL UCRL-104358, June, 1990.)

144. J. S. Kallman and J. G. Berryman, "Weighted least-squares methods for electrical impedance tomography," *IEEE Trans. Med. Imaging* **11**, 284–292 (1992). (Also, LLNL UCRL-106000, September, 1990.)

145. J. G. Berryman, "Global extrema in traveltime tomography," in *Computational Acoustics – Acoustic Propagation*, *Volume 2*, D. Lee, R. Vichinevetsky, and A. R. Robinson (eds.), Proceedings of the Third IMACS Symposium on Computational Acoustics, Harvard University, Cambridge, Massachusetts, June 26–28, 1991 (North-Holland, Amsterdam, 1993), pp. 45-62. **MR1208549 (93m:86004)** (Also, LLNL UCRL-JC-107927, July, 1991.) **MR 93m:86004**

146. J. G. Berryman, "Constraints on minimum model variance for seismic traveltime tomography," *Geophys. J. Int.* **119**, 689–692 (1994). (Also, Stanford Exploration Project Report **80**, 101–108 (1994).) (Also, LLNL UCRL-JC-115340, September, 1993.)

147. J. G. Berryman, "Resolution of iterative inverses in seismic tomography," in *Proceedings of the Cornelius Lanczos International Centenary Conference*, J. D. Brown, M. T. Chu, D. C. Ellison, and R. J. Plemmons (eds.), North Carolina State University, Raleigh, NC, December 12–17, 1993, (SIAM, Philadelphia, PA, 1994), pp. 297–299. (Also, LLNL UCRL-JC-116371, February, 1994.)

148. J. G. Berryman, "Tomographic resolution without singular value decomposition," in *Mathematical Methods in Geophysical Imaging II*, S. Hassanzadeh (ed.), Proceedings of SPIE, Volume 2301, 24–29 July, 1994, San Diego, CA (Bellingham, Washington, SPIE, 1994), pp. 2–13. (Also, LLNL UCRL-JC-117503, June, 1994.)

149. J. G. Berryman, "Variational structure of inverse problems in wave propagation and vibration," in *Inverse Problems in Wave Propagation*, IMA Volume 90, edited by G. Chavent, G. Papanicolaou, P. Sacks, and W. W. Symes, *Proceedings of the Workshop on Inverse Problems in Wave Propagation*, Institute of Mathematics and Its Applications, University of Minnesota, Minneapolis, Minnesota, March 5–17, 1995 (Springer-Verlag, New York, 1997), pp. 13–44. **MR1491666 (99a:65109)** (Also, a shorter version appeared in *Stanford Exploration Project Report* **SEP-84**, 357–381 (1995). (Also, LLNL UCRL-JC-120092, April, 1995.)

150. L. Borcea, J. G. Berryman, and G. C. Papanicolaou, "High contrast impedance tomography," *Inverse Problems* **12**, 835–858 (1996). **MR1421651** (Also, LLNL UCRL-JC-124201, May, 1996.)

151. L. Borcea, J. G. Berryman, and G. C. Papanicolaou, "Network asymptotics for high contrast impedance tomography," in *Inverse Problems in Geophysical Applications*, edited by H. W. Engl, A. K. Louis, and W. Rundell (SIAM, Philadelphia, PA, 1997), *Proceedings of the GAMM-SIAM Symposium on Inverse Problems in Geophysics*, Fish Camp, Yosemite, California, December 16–19, 1995, pp. 287–303. **MR1427996 (97i:86008)** (Also, LLNL UCRL-JC-124307, May, 1996.)

152. L. Borcea, J. G. Berryman, and G. C. Papanicolaou, "Matching pursuit for imaging

high contrast conductive media," *Inverse Problems* **15**, 811–849 (1999). **MR1710594 (2001b:78018)** (Also, LLNL UCRL-JC-128108, July, 1997.)

153. O. Dorn, H. Bertete-Aguirre, J. G. Berryman, and G. C. Papanicolaou, "A nonlinear inversion method for 3D-electromagnetic imaging using adjoint fields," *Inverse Problems* **15**, 1523–1558 (1999). **MR1733215 (2000k:78024)** (Also, LLNL UCRL-JC-134574, June, 1999.)

154. J. G. Berryman, "Analysis of approximate inverses in tomography I. Resolution analysis of common inverses," *Optimization and Engineering* **1**, 87–115 (2000). (Also, LLNL UCRL-JC-135513 Pt 1, August, 1999.)

155. J. G. Berryman, "Analysis of approximate inverses in tomography II. Iterative inverses," *Optimization and Engineering* **1**, 437–473 (2000). (Also, LLNL UCRL-JC-135513 Pt 2, August, 1999.)

156. N. J. Champagne II, J. G. Berryman, and H. M. Buettner, "FDFD: A 3D finite-difference frequency-domain code for electromagnetic induction tomography," *J. Computational Phys.* **170**, 830–848 (2001). **MR1844912 (2002d:78035)** (Also, LLNL UCRL-JC-135512, August, 1999.)

157. O. Dorn, H. Bertete-Aguirre, J. G Berryman, and G. C. Papanicolaou, "Sensitivity analysis of a nonlinear inversion method for 3D electromagnetic imaging in anisotropic media," *Inverse Problems* **18**, 285–317 (2002). **MR1910239 (2003d:78019)** (Published electronically January 24, 2002.) (Also, LLNL UCRL-JC-143962, May, 2001.)

158. L. Borcea, G. Papanicolaou, C. Tsogka, and J. Berryman, "Imaging and time reversal in random media," *Inverse Problems* **18**, 1247–1279 (2002). **MR1943391 (2004a:62120)** (Also, LLNL UCRL-JC-145563, October 10, 2001.)

159. J. G. Berryman, L. Borcea, G. C. Papanicolaou, and C. Tsogka, "Statistically stable ultrasonic imaging in random media," *J. Acoust. Soc. Am.* **112**, 1509–1522 (2002). (Also, LLNL UCRL-JC-146629, January 16, 2002.)

160. S. Fomel, J. G. Berryman, R. G. Clapp, and M. Prucha Clapp, "Iterative resolution estimation in least-squares Kirchhoff migration," *Geophys. Prospecting* **50**, 577–588 (2002). (Also, LLNL UCRL-JC-142532, February, 2001.)

161. O. Dorn, H. Bertete-Aguirre, J. G Berryman, and G. C. Papanicolaou, "Adjoint fields and sensitivities for 3D electromagnetic imaging in isotropic and anisotropic media," to appear in *Lecture Notes in Mathematics* (Springer-Verlag, New York). (Also, LLNL UCRL-JC-150242, December, 2002.)

162. C.-Y. Wang, D. S. Dreger, C.-H. Wang, D. Mayeri, and J. G. Berryman, "Field relations among coseismic ground motion, water-level change and liquefaction for

the 1999 Chi-Chi ($M_w = 7.5$) earthquake, Taiwan," *Geophys. Res. Lett.* **30**, 1890, doi:10.10292003GL017601 (2003). (Also, LLNL UCRL-JC-152339, March 20, 2003.)

163. D. H. Chambers and J. G. Berryman, "Time-reversal analysis for scatterer characterization," *Phys. Rev. Lett.* **92**, 023902 (January 16, 2004). (Also, LLNL UCRL-JC-154155, July 16, 2003.) (Also, LLNL UCRL-JP-200828, November 7, 2003.)

164. D. H. Chambers and J. G. Berryman, "Analysis of the time-reversal operator for a small spherical scatterer in an electromagnetic field," *IEEE Trans. Antennas and Propagation* **52**, 1729–1738 (2004). (Also, LLNL UCRL-JC-152633, April 10, 2003.

Internal Reports : *Conoco*

J. G. Berryman, "Maximum Entropy Spectral Analysis," Conoco Inc., Report No. 680-2-1-1-77, April, 1977.

J. G. Berryman, "Velocity Analysis," Conoco Inc., Report No. 680-2-5-1-77, July, 1977.

Internal Reports : *LLNL and LBL*

J. A. Beatty and J. G. Berryman, "Using the STOMP program for tomography with strong ray bending," LLNL UCID-21157, August, 1987.

J. G. Berryman and T. J. Yorkey, "New applications of Fermat's principle to traveltime tomography," LLNL UCRL-98859, June, 1988.

T. J. Yorkey and J. G. Berryman, "An iterative algorithm for traveltime tomography between boreholes," LLNL UCRL-100770, March, 1989.

S.-Y. Lu and J. G. Berryman, "Convergence of linear programming using a Hopfield net," LLNL UCRL-JC-105255, November, 1990.

J. G. Berryman, "Lecture notes on nonlinear inversion and tomography I. Borehole seismic tomography," LLNL UCRL-LR-105358, November, 1990; first expansion and revision, October, 1991. (Also published together with work by W. L. Rodi as "Notes on Inversion" by MIT/ERL, May, 1991.)

H. M. Buettner and J. G. Berryman, "A simple method for finding the efficiency of electrical soil heating," UCRL-JC-117163, April, 1994.

J. G. Berryman, "Some nonlinear reconstruction algorithms for electrical impedance tomography," LLNL UCRL-JC-143031, March, 2001.

P. A. Berge, J. G. Berryman, H. Bertete-Aguirre, B. P. Bonner, J. J. Roberts, and D. Wildenschild, "Joint inversion of geophysical data for site characterization and restoration monitoring," UCRL-ID-128343, July 31, 2000.

J. Barhen, J. G. Berryman, L. Borcea, J. Dennis, C. de Groot-Hedlin, F. Gilbert, P. Gill, M. Heinkenschloss, L. Johnson, T. McEvilly, J. Moré, G. Newman, D. Oldenburg, P. Parker, B. Porto, M. Sen, V. Torczon, D. Vasco, and N. B. Woodward,

"Optimization and Geophysical Inverse Problems," LBNL-46959, October, 2000.

J. V. Candy *et al.*, "Dynamic Focusing of Acoustic Energy for Nondestructive Evaluation," LLNL UCRL-ID-146148, November, 2001.

Internal Reports : Stanford and LLNL

J. G. Berryman, "Resolution for Lanczos and Paige-Saunders inverses in tomography," in *Stanford Exploration Project Sponsors' Report* **SEP-77**, May, 1993, pp. 161–174. (Also, LLNL UCRL-JC-113380, March, 1993.)

J. G. Berryman, "Computing tomographic resolution matrices using Arnoldi's iterative inversion algorithm," in *Stanford Exploration Project Sponsors' Report* **SEP-82**, October, 1994, pp. 165–176. (Also, LLNL UCRL-JC-118556, September, 1994.)

J. G. Berryman, "Nonlinear least squares and regularization," in *Stanford Exploration Project Sponsors' Report* **92**, April, 1996, pp. 245–252. (Also, LLNL UCRL-JC-124050, April, 1996.)

J. G. Berryman and S. Fomel, "Iterative methods of optimization with application to crosswell tomography," in *Stanford Exploration Project Sponsors' Report* **SEP-93**, October, 1996, pp. 109–132. (Also, LLNL UCRL-JC-125623, September, 1996.)

I. K. Fodor, J. G. Berryman, and P. B. Stark, "Comparison of autoregressive and multitaper spectral analysis for long time series," in *Stanford Exploration Project Sponsors' Report* **SEP-95**, November, 1997, pp. 331-355. (Also, LLNL UCRL-JC-128942, October, 1997.)

J. G. Berryman, L. Borcea, G. C. Papanicolaou, C. Tsogka, "Time-reversal acoustics for multiple targets," LLNL UCRL-JC-140465, September, 2000.

J. G. Berryman, "Time-reversal acoustics and maximum-entropy imaging," in *Stanford Exploration Project Sponsors' Report* **SEP-110**, August, 2001, pp. 31–48. (Also, LLNL UCRL-JC-145156, August, 2001.)

D. H. Chambers and J. G. Berryman, "RADAR imaging of spheres in 3D using MUSIC," LLNL UCRL-ID-151577, January 21, 2003.

Talks at Conferences and Special Lectures

J. G. Berryman, "Reconstruction of electrical properties of rocks using impedance imaging and tomography," talk at the Bay Area Workshop on Inverse Problems, Stanford University, July 31 – August 1, 1986. (Also, LLNL UCRL-95012 (ABST), July, 1986.)

J. G. Berryman, "New applications of Fermat's principle to seismic traveltime tomography," invited talk at the 17th International Conference on Mathematical Geophysics in Blanes, Spain, June 20-25, 1988.

J. G. Berryman, "Seismic traveltime tomography," invited talk given at the Twenty-Second Annual Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, Oct. 31-Nov. 2, 1988.

J. G. Berryman, "Seismic traveltime tomography and nonlinear constrained optimization," talk at MIT Earth Resources Laboratory, Third Annual Founding Members Workshop on Seismic Wave Propagation and Inversion in Heterogeneous Media, August 1, 1989.

J. G. Berryman, "Imaging fluid flow in rocks using electrical impedance tomography," invited talk at the Minisymposium on Theoretical and Practical Aspects of Electrical Impedance Tomography, SIAM Conference on Mathematical and Computational Isues in Geophysical Fluid and Solid Mechanics, Houston, Texas, September 25-28, 1989.

E. Owen, A. Ramirez, W. Daily, and J. Berryman, "Electrical resistivity tomography for vadose zone investigations," paper and talk presented at the ASTM Symposium on Ground Water and Vadose Zone Investigations, January 31, 1991, San Diego, CA. (Also, LLNL UCRL-JC-103485, April, 1990, and LLNL UCRL-JC-104168-abstract, 1990.)

J. G. Berryman, "Variational constraints for stabilizing reconstruction algorithms for nonlinear inversion problems," invited talk at the APS Physics Computing '91 Conference, June 10–14, 1991, San Jose, California.

J. G. Berryman, "Classical and nonclassical variational principles for constrained inversion of electrical boundary data," invited talk and abstract in Proceedings of Progress in Electromagnetic Research Symposium, Cambridge, Massachusetts, July 1-5, 1991, p. 43. (Also, LLNL UCRL-JC-105866 Abstract.)

J. G. Berryman, "Dual feasibility constraints for electrical impedance tomography," invited talk at the minisymposium on Electromagnetic Inverse Problems, Second International Conference on Industrial and Applied Mathematics (ICIAM), July 8–12, 1991, Washington, D.C.

J. G. Berryman, "Some stable reconstruction algorithms for electrical impedance tomography," talk and paper prepared for International Conference on Inverse Problems/Computational Algorithms, Texas A & M University, College Station, Texas, March 10–14, 1991. (Also, LLNL UCRL-JC-107990, July, 1991.)

J. G. Berryman, "Lecture notes on nonlinear inversion and tomography II. Electrical impedance tomography," prepared for a series of lectures given at University of California – Berkeley, March–May, 1993.

J. G. Berryman, "Challenges for computational physics in underground imaging of electrically conducting contaminant plumes," invited talk P2.03 in special session on Geological Phenomena at the International Conference on Computational Physics,

American Physical Society, Division of Computational Physics, Santa Cruz, California, August 25–29, 1997.

P. A. Berge, J. J. Roberts, J. G. Berryman, and D. Wildenschild, "Joint inversion of geophysical data for site characterization and restoration monitoring," abstract #188 in *Proceedings of Environmental Sciences Management Workshop*, Chicago, IL, July 27–30, 1998, pp. 378–380. (Also, LLNL UCRL-MI-128343, rev. 1, July, 1998.)

J. G. Berryman, "Surface and borehole electromagnetic imaging of conducting contaminant plumes," abstract #189 in *Proceedings of Environmental Sciences Management Workshop*, Chicago, IL, July 27–30, 1998, pp. 380–382. (Also, LLNL UCRL-JC-131326, July 17, 1998.)

N. J. Champagne, II, J. G. Berryman, H. M. Buettner, J. B. Grant, and R. M. Sharpe, "A finite-difference frequency-domain code for electromagnetic induction tomography," poster and paper in *1999 Conference Proceedings of the Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP)*, Oakland, CA, March 14–18, 1999, pp. 931–940. (Also, LLNL UCRL-JC-131590 abs, August, 1998.)

H. M. Buettner and J. G. Berryman, "An electromagnetic induction tomography field experiment at Lost Hills, CA," talk and paper in *1999 Conference Proceedings of the Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP)*, Oakland, CA, March 14–18, 1999, pp. 663–672. (Also, LLNL UCRL-JC-131591 abs, August, 1998.)

J. G. Berryman, "Underground imaging of electrically conducting plumes," invited talk at the International Advanced Studies Institute, First International Symposium on *Detection and Analysis of Subsurface Objects and Phenomena*, Naval Postgraduate School, Monterey, California, October 19–23, 1998.

P. A. Berge and J. G. Berryman, "Developing rock physics algorithms for velocity-porosity relations with environmental geophysics applications," talk presented at the Fifth SIAM Conference on Mathematical and Computational Issues in the Geosciences, San Antonio, Texas, March 24–27, 1999. (Also, LLNL UCRL-JC-132054 abs, September, 1998.)

P. A. Berge, J. G. Berryman, B. P. Bonner, J. J. Roberts, and D. Wildenschild, "Comparing geophysical measurements to theoretical estimates for soil mixtures at low pressures," talk and paper in *1999 Conference Proceedings of the Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP)*, Oakland, CA, March 14–18, 1999, pp. 465–472. (Also, LLNL UCRL-JC-132893, January, 1999.)

J. G. Berryman, N. J. Champagne II, and H. M. Buettner, "A 3D finite-difference frequency-domain code for electromagnetic induction tomography," talk and paper in

the Proceedings of the Second International Symposium on Three-Dimensional Electromagnetics, University of Utah, Salt Lake City, Utah, October 27–29, 1999. (Also, LLNL UCRL-JC-134821, June, 1999.)

J. G. Berryman, "Computing resolution in acoustic tomography," invited talk in Session 2aSP, Acoustical Imaging and Tomography, at the Acoustical Society of America meeting in Atlanta, Georgia, May 31, 2000. (LLNL UCRL-JC-137268 abs, January, 2000.)

J. G. Berryman, "Time-reversal acoustics for multiple targets," talk at the American Mathematical Society Meeting 960, University of Alabama, Birmingham, Alabama, November 10–12, 2000. (Also, LLNL UCRL-JC-140465, October, 2000.)

J. G. Berryman, "Inversion methods for ultrasonic traveltime tomography," talk at the Acoustical Society of America meeting in Newport Beach, California, December 3–8, 2000. (LLNL UCRL-JC-140105 abs, August, 2000.)

165. J. G. Berryman, L. Borcea, G. C. Papanicolaou, and C. Tsogka, "Statistical stability and time-reversal imaging in random media," in *Geometric Methods in Inverse Problems and PDE Control*, IMA Vol. 137, *Proceedings of the Institute for Mathematics and Its Applications Workshop on Geometric Methods in Inverse Problems and PDE Control*, Minneapolis, Minnesota, July 16–27, 2001, edited by Christopher B. Croke, Irena Lasiecka, Gunther Uhlmann, and Michael Vogelius (Springer-Verlag, New York, 2004), pp. 15–24. (Also, Stanford Exploration Project Sponsors' Report, SEP-111, April, 2002, pp. 139-149.) (Also, UCRL-JC-147088, February, 2002.)

J. G. Berryman, "Time-reversal acoustics and maximum-entropy imaging," talk given at the Acoustical Society of America meeting in Fort Lauderdale, Florida, December 3–7, 2001.

L. Borcea, J. Berryman, G. Papanicolaou, and C. Tsogka, "Imaging in random media," talk given at the Acoustical Society of America meeting in Fort Lauderdale, Florida, December 3–7, 2001.

H. Bertete-Aguirre, O. Dorn, J G. Berryman, and G. C. Papanicolaou, "3D electromagnetic imaging using adjoint fields," talk to be given Tuesday, June 18th, at the 2002 IEEE AP-S International Symposium and USNC/URSI Radio Science Meeting, San Antonio, Texas, June 16–21, 2002. (LLNL UCRL-JC-147760-ext-abs, March 28, 2002.)

R. R. Leach, S. G. Azevedo, J. G. Berryman, H. R. Bertete-Aguirre, D. H. Chambers, J. E. Mast, P. Littrup, N. Duric, S. A. Johnson, and F. Wuebbling, "A comparison of ultrasound tomography methods in circular geometry," *SPIE Conference on Medical Imaging 2002*, February 23–28, 2002, San Diego, CA, LLNL UCRL-JC-145037, February 7, 2002

D. H. Chambers and J. G. Berryman, "Acoustical imaging of spheres above a reflecting surface," 145th Meeting of the Acoustical Soceity of America in Nashville, Tennessee, April 28 – May 2, 2003, *JASA* **113**, pp. 2232.

D. H. Chambers and J. G. Berryman, "Analysis of the time-reversal operator for planar dipole arrays," IEEE Antennas and Propagation Society International Symposium in Monterey, CA, June 20–24, 2004, LLNL UCRL-CONF-202032, January 16, 2004.

J. G. Berryman, "Approximate methods for time-reversal processing of large seismic reflection data sets," invited talk, Acoustical Society of America, May 25, 2004. (Also, LLNL UCRL-ABS-201873, January 16, 2004.) (Also, LLNL UCRL-PRES-204529, June 7, 2004.)

MISCELLANY

U. S. Patent No. 5,325,918: Issued for "Optimal Joule Heating of the Subsurface" to J. G. Berryman and W. D. Daily on July 5, 1994.

U. S. Patent No. 6,147,497: Issued for "Using Electrical Impedance Tomography to Map Subsurface Hydraulic Conductivity," to J. G. Berryman, W. D. Daily, A. L. Ramirez, and J. J. Roberts, on November 14, 2000. (Abstract in *Science and Technology Review*, April, 2001.)

U. S. Patent No. 6,269,311: Issued for "Discrimination of Porosity and Fluid Saturation Using Seismic Velocity Analysis," to J. G. Berryman, on July 31, 2001. (Abstract in *Geophysics* **66**, 1641, 2001; also in *Science and Technology Review*, October, 2001.)

U. S. Patent No. 6,755,083: Issued for "Method for Distinguishing Multiple Targets Using Time-Reversal Acoustics," to J. G. Berryman, on June 29, 2004.

Letter: A brief for brevity, in *Physics Today* **45**, 114 (December, 1992).

Book review: *Porous Media – Geometry and Transports*, by P. M. Adler, in *Int. J. Multiphase Flow* **19**, 720 (1993).

Book review: *Mathematics of Multidimensional Seismic Imaging, Migration, and Inversion*, by N. Bleistein, J. K. Cohen, and J. W. Stockwell, Jr., in *Applied Mechanics Reviews* **54**, B94–B95 (2001).

Book review: *Seismic Ray Theory*, by V. Cerveny, in *Applied Mechanics Reviews* **55**, B118–B119 (2002).

Patent disclosure IL-7161: "Method for Determining Changes in Fluid Permeability of Porous Materials," J. G. Berryman, B. P. Bonner, and R. C. Y. Chin

Patent disclosure IL-8237: "Reconstruction Method for Nonlinear Traveltime Tomography," J. G. Berryman, April 14, 1989.

Patent disclosure IL-8443: "Optimal Joule Heating of the Subsurface," J. G. Berryman

and W. D. Daily, February 13, 1990.

Patent disclosure IL-9684: "Using Electromagnetic Induction Tomography to Map Subsurface Temperature," J. G. Berryman, D. A. Chesnut, R. L. Newmark, and M. J. Wilt, December 16, 1994, submitted February 27, 1995.

Patent disclosure IL-10033: "Smart Fuses Based on Projectile-Target-Interaction Self-Noise," J. G. Berryman, September 10, 1996.

Patent disclosure IL-10097: "Using Electrical Impedance Tomography to Map Subsurface Hydraulic Conductivity," J. G. Berryman, W. D. Daily, and A. L. Ramirez, January 10, 1997.

Patent disclosure IL-10412: "Joint Inversion of Electrical and Electromagnetic Tomography Data for Mapping Saturation Level and Connectivity of Conducting Fluids Underground," J. G. Berryman, November 6, 1998.

"Getting down to environmental cleanup basics," *Science and Technology Review*, November, 1998, pp. 12–20. (LLNL UCRL-52000-98-11, November, 1998.)

Ph.D. thesis reading committee member for:
Jeffrey S. Kallman, *Remote Sensing of Axial Multipoles*, University of California, Davis Applied Science, September, 1994.

Ph.D. thesis reading committee member and oral defense committee member for:
Liliana Borcea, *Direct and Inverse Problems for Transport in High Contrast Media*, Scientific Computing and Computational Mathematics Department, Stanford University, May, 1996.
Knut Solna, *Stable Spreading of Acoustic Pulses Due to Laminated Microstructure*, Mathematics Department, Stanford University, December, 1996.

Ph.D. oral defense committee member for:
Li Teng, *Seismic and Rock-Physics Characterization of Fractured Reservoirs*, Geophysics Department, Stanford University, May, 1998.

Ph.D. thesis reading committee member for:
Sergey Fomel, *Three-Dimensional Seismic Data Regularization*, Geophysics Department, Stanford University, November, 2000.

Member Scientific Committee, Biot Conference on Poromechanics, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, September 14–16, 1998.

Member of organizing committee, National Science Foundation sponsored Mathematical Geophysics Summer School, Stanford University, 1998–2002.

Participant in National Science Foundation Special Workshop on Frontiers of Mathematics in the Geosciences, March 5–7, 2001, held at the Institute for Mathematics and Its Applications, University of Minnesota, Minneapolis, Minnesota.

Participant and discussion leader in DOE Office of Basic Energy Sciences Seismic Attenuation Workshop, December 5–6, 2001, held at the Claremont Hotel, Berkeley, California.

WWW Home Page: http://sepwww.stanford.edu/sep/berryman

OTHER TALKS

J. G. Berryman, "Estimating fluid permeability of rocks using image processing techniques," Exploration Research Division, Conoco Inc., Ponca City, OK, February, 1987.

J. G. Berryman, "Microgeometry of composites," Stanford University, Stanford, CA, March, 1987.

J. G. Berryman, "Waves in porous media," Northwestern University, Evanston, IL, July, 1987.

J. G. Berryman, "Image processing methods and the theory of composites," Courant Institute, New York University, NY, NY, October, 1987.

J. G. Berryman, "Waves in porous media," MIT, Cambridge, MA, October, 1987.

J. G. Berryman, "Seismic tomography," NJIT, Newark, NJ, December, 1987.

J. G. Berryman, "Microgeometry of rocks," Schlumberger-Doll Research, Ridgefield, CT, April, 1988.

J. G. Berryman, "Waves in porous media," Rutgers University, Piscataway, NJ, May, 1988.

J. G. Berryman, "Traveltime tomography," Courant Institute, New York University, NY, NY, May, 1988.

J. G. Berryman, "Seismic traveltime tomography," Lawrence Livermore National Laboratory, October, 1988.

J. G. Berryman, "Waves in porous media," Ohio State University, Columbus, OH, November, 1988.

J. G. Berryman and S. C. Blair, "Estimating fluid permeability of rocks using image processing techniques," Chevron Oil Field Research, LaHabra, CA, January, 1989.

J. G. Berryman, "Seismic tomography and nonlinear constrained optimization," Center of Pure and Applied Mathematics, University of California, Berkeley, March, 1989.

J. G. Berryman, "Seismic waves in porous rocks," ARCO Oil and Gas Company, Plano, Texas, March, 1989.

J. G. Berryman, "Seismic tomography," Mobil Research and Development Corporation, Dallas, Texas, March, 1989.

J. G. Berryman, "Seismic traveltime tomography and nonlinear constrained optimization," Earth Resources Laboratory, MIT, Cambridge, Mass., April, 1989.

J. G. Berryman, "Traveltime tomography and nonlinear constrained optimization," Courant Institute, NYU, NYC, April, 1989.

J. G. Berryman, "Underground Imaging," briefing to the JASONs, Mitre Corporation,

LaJolla, CA, July 10, 1989.

J. G. Berryman, "Robust iterative reconstruction methods for nonlinear tomography," Lawrence Livermore National Laboratory, October 6, 1989.

J. G. Berryman, "Variational methods for nonlinear tomography and composites," University of Minnesota, April 23, 1990.

J. G. Berryman, "Seismic crosshole tomography with variational constraints," Exxon, Houston, June 13, 1990.

J. G. Berryman, "Nonlinear inversion and tomography," summer lecture series at MIT (10 lectures), July, 1990.

J. G. Berryman, "Crosshole tomography," Schlumberger-Doll Research, Ridgefield, CT, July 16, 1990.

J. G. Berryman, "Ghosts in tomography," presented at MIT Earth Resources Laboratory, Fourth Annual Founding Members Workshop on Seismic Wave Propagation and Inversion in Heterogeneous Media, Woodstock, Vermont, July 24-27, 1990.

J. G. Berryman, "Analysis of the Exxon crosshole data set," presented at MIT Earth Resources Laboratory, Fourth Annual Founding Members Workshop on Seismic Wave Propagation and Inversion in Heterogeneous Media, Woodstock, Vermont, July 24-27, 1990.

J. G. Berryman, "Traveltime tomography," Stanford University, October, 1990.

W. D. Daily and J. G. Berryman, "Electrical impedance tomography," UC Berkeley, Berkeley, CA, October 24, 1990.

J. G. Berryman, "Classical and nonclassical variational principles for electrical impedance tomography," Lawrence Livermore National Laboratory, December 14, 1990.

J. G. Berryman, "New approaches to underground imaging," OBES Review of Underground Imaging, Berkeley, March, 1991.

J. G. Berryman, "Generalization of Gassmann's equation," talk at MIT/ERL, June 28, 1991.

J. G. Berryman, "Data constraints for seismic and electrical crosshole tomography," Exxon Production Research, Houston, TX, September 18, 1991.

J. G. Berryman, "Fermat's principle and nonlinear traveltime tomography," Rice University, Houston, TX, September 19, 1991.

J. G. Berryman, "Seismic crosshole tomography," Conoco Inc., Ponca City, OK, October 1, 1991.

J. G. Berryman, "Data constraints and seismic traveltime tomography," Amoco, Tulsa, OK, October 2, 1991.

J. G. Berryman, "Some exact results for deformation of porous media containing fluids: Generalization of Gassmann's equation," Lawrence Livermore National Laboratory, November 6, 1991.

J. G. Berryman, "Exact generalization of Gassmann's equation and effective stress for inhomogeneous porous rock," Stanford University, December 5, 1991.

J. G. Berryman, "Exact effective stress rules for porous media," Courant Institute, NYU, February 14, 1992.

J. G. Berryman, "Nonlinear inversion problems," Institute for Advanced Study, Princeton, NJ, April 15, 1992.

J. G. Berryman, "Constraints from data for seismic crosshole tomography," Annual Project Review Meeting, Center for Wave Phenomena, Colorado School of Mines, Keystone, Colorado, May 28, 1992.

J. G. Berryman, "Constraints from data for seismic crosshole tomography," University of Utah, Salt Lake City, Utah, July 14, 1992.

J. G. Berryman, "Nonlinear inversion and tomography," Stanford Tomography Project Sponsor Meeting, Stanford University, July 21, 1992.

J. G. Berryman, "Ultrasonic waves in hydrocarbon mixtures," Stanford University, October 14, 1992.

J. G. Berryman, "Waves in fluid/fluid, solid/fluid, and solid/solid mixtures," Lawrence Livermore National Lab, November 3, 1992.

J. G. Berryman, "Effective properties of mixtures," University of California – Davis, Department of Applied Science, Livermore, CA, November 17, 1992.

J. G. Berryman, "Mixture theories for rock properties," Stanford University, December 2, 1992.

J. G. Berryman, "Effective properties of mixtures," Rice University, Houston, TX, February 2, 1993.

J. G. Berryman, "Realizable models in equivalent medium theory," Stanford University, February 17, 1993.

J. G. Berryman, "Resolution of iterative inverses," Stanford University, March 17, 1993.

J. G. Berryman, "Feasibility constraints for crosshole seismic," Stanford University, April 2, 1993.

J. G. Berryman, "Lectures on nonlinear inversion and tomography," series of 11 lectures at UC-Berkeley, March 29–May 4, 1993.

J. G. Berryman, "Fast ray tracing methods for anisotropic media," Stanford University,

May 6, 1993.

J. G. Berryman, "Resolution for iterative inverses in tomography," University of Utah, May 10, 1993.

J. G. Berryman, "Effective stress laws for porous media," University of Utah, May 12, 1993.

J. G. Berryman, "Bounds and realizable models for properties of viscoelastic composites," Stanford University, August 10, 1993.

J. G. Berryman, "Nonlinear inversion and tomography," Stanford University, October 15, 1993.

J. G. Berryman, "Realizable effective medium theories in elasticity, viscoelasticity, and poroelasticity," UC – Berkeley, October 22, 1993.

J. G. Berryman, "Resolution for nonlinear seismic tomography?" Stanford University, November 3, 1993.

J. G. Berryman, "Effective medium theories for elastic, viscoelastic, and poroelastic composites," Institut de Physique du Globe de Paris, November 10, 1993.

J. G. Berryman, "Gassmann and porous media," UC Berkeley, December 17, 1993.

J. G. Berryman, "Attenuation tomography," Stanford University, January 25, 1994.

J. G. Berryman, "Attenuation measurements: Spectral ratios, rise times, and center frequencies," Stanford University, March 2, 1994.

J. G. Berryman, "Mixture theories for rock properties," Stanford University, March 31, 1994.

J. G. Berryman, "Stress-induced anisotropy in rocks," Stanford Exploration Project Sponsors Meeting, Fallen Leaf Lake, CA, May 17, 1994.

J. G. Berryman, "Bounds on bulk and shear moduli for viscoelastic composites," Stanford University, May 25–26, 1994.

J. G. Berryman, "Biot, permeability, and seismic attenuation," Stanford Tomography Project Sponsors Meeting, Santa Cruz, CA, June 24, 1994.

J. G. Berryman, "More about resolution matrices for LSQR," Stanford University, July 13, 1994.

J. G. Berryman, "Nonlinear inversion and crosswell seismic tomography," University of Wisconsin – Madison, October 4, 1994.

J. G. Berryman, "Understanding properties of viscoelastic composites," LLNL, November 11, 1994.

J. G. Berryman, "Gassmann's equation for fluid-saturated rocks", Mobil, Dallas, TX,

January 20, 1995.

J. G. Berryman, "Double-porosity models for fluid transport and seismic wave propagation in fractured reservoirs," Stanford University, January 25, 1995.

J. G. Berryman, "Role of rock physics in reservoir characterization," Karlsruhe University, Karlsruhe, Germany, June 12, 1995.

J. G. Berryman, "Transparent gifs and greek letters for use on Web pages," Stanford University, October 30, 1995.

J. G. Berryman, "Gassmann and AVO analysis," Stanford University, December 4, 1995.

J. G. Berryman, "Double porosity models for fractured reservoirs," Lawrence Berkeley Laboratory, January 18, 1996.

J. G. Berryman, "Nonlinear least-squares methods and regularization – Comparison to CG," Stanford University, February 21, 1996.

J. G. Berryman, "Analysis of robust estimation methods," Stanford University, March 13, 1996.

J. G. Berryman, "Estimating viscoelastic constants of two-phase composites," Stanford University, June 12, 1996.

J. G. Berryman, "Resolution of iterative inversion methods using partial reorthogonalization," Stanford University, August 7, 1996.

J. G. Berryman, "Effective medium theories consistent with Biot and Gassmann," Amoco, Houston, Texas, January 13, 1997.

J. G. Berryman, "Rock physics and anisotropy," Colorado School of Mines, Golden, Colorado, January 23, 1997.

J. G. Berryman and Sergey Fomel, "Iterative methods of optimization with application to crosswell tomography," Stanford Exploration Project Sponsors' Meeting, Asilomar, Pacific Grove, CA, May 13, 1997.

J. G. Berryman, V. Grechka, and P. A. Berge, "Analysis of Thomsen parameters for finely layered VTI media," Stanford Exploration Project Sponsors' Meeting, Asilomar, Pacific Grove, CA, May 13, 1997.

J. G. Berryman, "Effective stress in rocks," Lawrence Livermore National Lab, July 8, 1997.

J. G. Berryman, "Rigorous bounds on the complex shear modulus of viscoelastic composites," Courant Institute, New York University, NYC, July 14, 1997.

J. G. Berryman, "Poroelasticity and effective medium theory," 8th ACBM/NIST Computer Modeling Workshop, National Institute of Standards and Technology, Gaithers-

burg, MD, July 28–31, 1997.

J. G. Berryman, "Permeability estimates from images of isotropic and anisotropic porous media," NIST, Gaithersburg, MD, August 1, 1997.

J. G. Berryman, "Linear and Nonlinear Mechanics of Rocks," Nonlinear Processes in Geoscience, OBES, Albuquerque, New Mexico, August 11–12, 1997.

J. G. Berryman, "Autoregressive and multitaper spectral analysis of time series," Stanford University, October 8, 1997.

J. G. Berryman, "Some inverse problems in digital stereology," Stanford University, December 3, 1997.

J. G. Berryman, "Interpretation: At the interface between underground imaging and rock physics," LLNL, December 19, 1997.

J. G. Berryman, "Mechanical Properties of Composite Systems," weeklong series of lectures at Instituto de Física, U.N.A.M., Mexico City, Mexico, January 26 – January 30, 1998.

J. G. Berryman, "Site characterization: At the interface between underground imaging and rock physics," Columbia University, April 27, 1998.

J. G. Berryman, "Easy derivations of effective medium theories for isotropic poroelastic composites (i.e., rocks containing fluids)," Stanford University, May 5, 1998.

J. G. Berryman, "Microstructure and mixture theories for rocks," Stanford University, May 28, 1998.

J. G. Berryman, "Effective medium theories for porous composite materials," 9th ACBM/NIST Computer Modeling Workshop, National Institute of Standards and Technology, Gaithersburg, MD, August 27, 1998.

J. G. Berryman, "Inversion in seismology and electromagnetics," Geosciences-Rennes, France, September 22, 1998.

J. G. Berryman, "Digital image analysis for rock properties," Geosciences-Rennes, France, September 23, 1998.

J. G. Berryman, "Waves in double-porosity materials," Stanford University, October 7, 1998.

J. G. Berryman, "Double porosity modeling in elastic wave propagation for reservoir characterization," Neville G. W. Cook Conference, Lawrence Berkeley National Laboratory, October 16, 1998.

J. G. Berryman, "Waves in layered porous earth materials," Stanford University, October 28, 1998.

J. G. Berryman, "More about waves in double-porosity media," Stanford University,

November 11, 1998.

J. G. Berryman, "Surface and borehole electromagnetic imaging of conducting contaminant plumes," Signal and Imaging Sciences Workshop, LLNL, November 12–13, 1998.

J. G. Berryman, "Correlation of seismic velocities and partial saturation data," Stanford University, January 25, 1999.

J. G. Berryman, "Robust correlation of seismic velocities and partial saturation data," Stanford University, February 24, 1999.

J. G. Berryman, "Role of Lamé λ in partial saturation problems," Stanford University, March 15, 1999.

J. G. Berryman, "Use and meaning of λ-diagrams in partial saturation problems," Stanford University, April 14, 1999.

J. G. Berryman, "EMSP: Electromagnetic Induction Tomography," poster presentation at LLNL at the Earth and Environmental Sciences Directorate Scientific Advisory Committee Meeting, May 25, 1999.

J. G. Berryman, "Porous Media Acoustics," Naval Postgraduate School, Monterey, CA, June 4, 1999.

J. G. Berryman, "Understanding seismic velocity decrements in regions of partial melt," Stanford University, July 1, 1999.

J. G. Berryman, "Electromagnetic Induction Tomography," poster presentation at LLNL at the Earth and Environmental Sciences Directorate Opportunities and Challenges Annual Review, July 30, 1999.

J. G. Berryman, "Forward modeling: Waves and rays," Mathematical Geophysics Summer School, Stanford University, August 2, 1999.

J. G. Berryman, "Linear tomography," Mathematical Geophysics Summer School, Stanford University, August 3, 1999.

J. G. Berryman, "Nonlinear tomography," Mathematical Geophysics Summer School, Stanford University, August 5, 1999.

J. G. Berryman, "Undergound imaging of electrically conducting plumes," The Mathematics of Imaging Workshop, MSRI, Berkeley, CA, November 2, 1999.

J. G. Berryman, "Saturation-proxy plots, data-sorting plots, and relationship to AVO data," Stanford University, January 7, 2000.

J. G. Berryman, "Constraints in seismic and acoustic tomography. Part I. Feasibility constraints," Lawrence Berkeley National Laboratory, April 20, 2000.

J. G. Berryman, "Constraints in seismic and acoustic tomography. Part II. Constrained

backprojection," Lawrence Berkeley National Laboratory, April 27, 2000.

J. G. Berryman, "Overview of effective medium theory," 11th ACBM/NIST Computer Modeling Workshop, National Institute of Standards and Technology, Gaithersburg, Maryland, May 24, 2000.

J. G. Berryman, "Introduction to dispersion in poroelastic systems," Mathematical Geophysics Summer School, Stanford University, August 11, 2000.

J. G. Berryman, "Time-reversal acoustics for multiple targets," Center for Advanced Signal and Imaging Sciences (CASIS/LLNL), Signal and Imaging Sciences Workshop, LLNL, November 16, 2000. (Also, LLNL UCRL-JC-140465, October, 2000.)

J. G. Berryman, "Estimating rock porosity and fluid saturation using only seismic velocities," Geophysical Society of Tulsa, Bartlesville, Oklahoma, April 19, 2001.

J. G. Berryman, S. R. Pride, and H. F. Wang, "A differential scheme for elastic properties of rocks with dry or saturated cracks," Stanford Exploration Project Sponsors' Meeting, Pajaro Dunes, California, April 24, 2001.

J. G. Berryman, "Time-reversal acoustics and maximum-entropy imaging," Institute for Mathematics and Its Applications, Workshop on Geometric Methods in Inverse Problems and PDE Control, University of Minnesota, Minneapolis, Minnesota, July 25, 2001.

J. G. Berryman, "Estimating rock porosity and fluid saturation using only seismic velocities," Earth and Space Sciences Department, University of Washington, Seattle, Washington, October 4, 2001.

J. G. Berryman, "Time-reversal acoustics and maximum-entropy imaging," Applied Physics Laboratory, University of Washington, Seattle, Washington, October 5, 2001.

J. G. Berryman, "Time-reversal acoustics for multiple targets," Inverse Problems and Applications Workshop, MSRI, Berkeley, CA, November 16, 2001.

J. G. Berryman, "Time-reversal acoustics and maximum-entropy imaging," Center for Advanced Signal and Imaging Sciences (CASIS/LLNL), Signal and Imaging Sciences Workshop, LLNL, November 19, 2001.

J. G. Berryman, P. A. Berge, and B. P. Bonner, "Estimating rock porosity and fluid saturation using only seismic velocities," University of Texas Institute for Geophysics (UTIG), Austin, Texas, February 8, 2002.

J. G. Berryman, L. Borcea, G. C. Papanicolaou, and C. Tsogka, "Statistical stability and time-reversal imaging in random media," Stanford Exploration Project Sponsors' Meeting, Furnace Creek Inn, Death Valley, California, April 22–25, 2002.

J. G. Berryman, "Poroelasticity," UC-Berkeley, Berkeley, CA, April 29, 2002.

J. G. Berryman, "Multi-scale modeling and imaging in reservoirs," Mathematical Geophysics Summer School, Stanford University, August 16, 2002.

J. G. Berryman, "Statistically stable ultrasonic imaging in random media," Center for Advanced Signal and Imaging Sciences (CASIS/LLNL), Signal and Imaging Sciences Workshop, LLNL, November 15, 2002.

J. G. Berryman, "SVD for elastic analysis of finely layered VTI media," Colorado School of Mines, Golden, CO, February 6, 2003.

J. G. Berryman, "Roles of poroelasticity in oil and gas exploration and exploitation," Colorado School of Mines, Heiland Lecture, Golden, CO, February 6, 2003.

J. G. Berryman, "Dynamic permeability in poroelasticity," UC-Berkeley, Berkeley, CA, March 12, 2003.

J. G. Berryman, "Sound velocity and attenuation in weakly consolidated saturated sands – Part I," University of Washington – Applied Physics Laboratory, Seattle, WA, May 14, 2003.

J. G. Berryman, "Sound velocity and attenuation in weakly consolidated saturated sands – Part II," University of Washington – Applied Physics Laboratory, Seattle, WA, May 28, 2003.

J. G. Berryman, "Acoustic and electromagnetic applications of time-reversal to detection and imaging," University of Washington – Applied Physics Laboratory, Seattle, WA, July 9, 2003.

J. G. Berryman, "Acoustic and electromagnetic applications of time-reversal to detection and imaging – Part II," University of Washington – Applied Physics Laboratory, Seattle, WA, July 23, 2003.

J. G. Berryman, "Stochastic lensing," Stanford University, August 27, 2003.

J. G. Berryman, "Poroelastic analysis of Thomsen parameters for seismic waves in finely layered VTI media," Stanford University, September 17, 2003.

J. G. Berryman, "Poroelastic analysis of Thomsen parameters for seismic waves," GP120 class, Stanford University, October 9, 2003.

J. G. Berryman, "Poroelasticity," a series of eight lectures over two days at the University of Petroleum – Beijing, China, November 20–21, 2003.

J. G. Berryman, "Scale-up in poroelastic systems and applications to reservoirs," Stanford University, November 25, 2003.

J. G. Berryman, "Time-reversal processing of reflection seismic data," Stanford University, February 2, 2004.

J. G. Berryman, "Shear wave splitting due to pore fluids: Gassmann confounded by

earth heterogeneity," Stanford University, March 1, 2004.

J. G. Berryman, "Laboratory partial saturation data and poroelastic shear dependence on fluids," Stanford University, Stanford, CA, April 14, 2004.

J. G. Berryman, "Laboratory partial saturation data and poroelastic shear dependence on fluids," Lawrence Berkeley National Lab, Berkeley, CA, April 16, 2004.

J. G. Berryman, "Poroelastic fluid effects on shear for rocks," Stanford Exploration Project Sponsors' Meeting, Asilomar, Pacific Grove, CA, May 19, 2004.

J. G. Berryman, "Up-Scaling and Poroelasticity," Cal Tech, Pasadena, CA, February 16, 2005.

J. G. Berryman, "Transport coefficients in porous and granular media," Directorate Review Committee Poster Presentation, LLNL Energy and Environment Directorate, March 15, 2005.

J. G. Berryman, "An almost solvable model for geomechanics of double-porosity reservoirs," Stanford Geophysics SWP Seminar, Stanford University, Stanford, CA, May 9, 2005.

J. G. Berryman, "Time reversal for radar imaging of objects hidden by clutter," Scripps Institute of Oceanography, La Jolla, CA, October 7, 2005.

J. G. Berryman, "Roles of poroelasticity in oil and gas exploration and exploitation," University of Wisconsin – Madison, Geology and Geophysics Department, Madison, WI, November 1, 2005.

J. G. Berryman, "Physics of viscoelastic composites," University of Wisconsin – Madison, Physics Department, Madison, WI, November 2, 2005.

J. G. Berryman, "Time reversal for radar imaging of objects hidden by clutter," Lawrence Berkeley Laboratory, Berkeley, CA, November 4, 2005.

J. G. Berryman, "Seismic waves in rocks with fluids and fractures," SEP Annual Sponsors' Meeting, Furnace Creek Inn, Death Valley, CA, March 6–9, 2006.