Juan E. Santos

Vita

Born: December 4, 1948, Buenos Aires, Argentina

Education

Computador Científico	Universidad de Buenos Aires	1971
Licenciado en Matemática	Universidad de Buenos Aires	1974
Ph. D., Mathematics	University of Chicago	1983

PUBLICATIONS

BOOKS

1. J. E. Santos and P. M. Gauzellino, *Numerical Simulation in Applied Geophysics*, Birkhauser, Lecture Notes in Geosystems Mathematics and Computing, W. Freeden, Kaiserslautern, Z. Nashed, Orlando O. Scherzer (Eds), Vienna, ISBN 978-3-319-48456-3, ISBN 978-3-319-48457-0 (eBook) **DOI**: 10.1007/978-3-319-48457-0, 321 pages (2017).

BOOK CHAPTERS

[1] J. E. Santos, J. M. Carcione, G. B. Savioli and P. M. Gauzellino, *Analysis of Infectious Disease Problems (COVID-19) and their global impact Chapter Title:An SEIR epidemic model of fractional order to analyze the evolution of the COVID-19 epidemic in Argentina,* **DOI***: 10.1007/978-16-2450-6-25* (2021), 539-557.

Refereed Journals

[106] J. E. Santos, G. B. Savioli and J. Ba, *On the existence and uniqueness of solutions of thermo-poroelastic media saturated by two-phase fluids*, Applicable Analysis, DOI: 10.1080/00036811.2025.2562456 **https://doi.org/10.1080/00036811.2025.2562456** (2025), 1-21.

[105] J. E. Santos, G. B. Savioli and J. Ba, *Analysis of wave propagation in non-isothermal poroelastic solids saturated by two-phase fluids*, Geophys. J. Int. **237, https://doi.org/10.1093/gji/ggae088** (2024), 1030 – 1047.

[104] N. Z. Arenas Zapata, J. E. Santos, G. B. Savioli, J. M. Carcione and J. Ba, *A numerical extension of White's theory of P-wave attenuation to non-isothermal poroelastic media*, J. Acoust. Soc. Am. **155 (2), https://doi.org/10.1121/10.0024979** (2024), 1486 – 1491.

[103] N. Z. Arenas Zapata, G. B. Savioli, J. E. Santos and P. M. Gauzellino, *Numerical simulation of fracking and gas production in shale gas reservoirs*, Geophys. Prospecting **https://doi.org/10.1111/1365-2478.13462, 1 - 13** (2023).

[102] J. E. Santos, J. M. Carcione, G.B. Savioli and J. Ba, *Wave propagation in thermo-poroelasticity. A finite element approach*, Geophysics **88, WA161WA175, (2023) https://doi.org/10.1190/GEO2022-0271.1**.

[101] J. E. Santos, J. M. Carcione, and J. Ba, *Two-phase flow effects on seismic wave anelasticity in anisotropic poroelastic media*, Energies **14, 6528,://https:/doi.org/10.3390/en14206528** (2021).

[100] Zhou, X., Ba, J., Santos, J. E., Carcione, J. M., L-Y. and Pang, M., *Fluid Discrimination in ultra-Deep reservoirs based on a double double-porosity theory*, Frontiers in Earth Science, Rock physics and geofluid detection, J. Ba, J. M. Carcione, E. H Saenger, B. Quintal,L. Fu, L. Adam and R. Sharma (Eds.) Lausanne: Frontiers Media SA. **://https/doi.org/10.3389/978-2-88971-562-6, 1 − 10** (2021).

[99] J. E. Santos, P. M. Gauzellino, J. M. Carcione, and J. Ba, *Effective anisotropic and viscoelastic representation of gas-hydrate bearing sediments from finite-element harmonic experiments*, Computational Geosciences **https://doi.org/10.1007/s10596-021-10077-8** (2021).

[98] J. E. Santos, J. M. Carcione, G.B. Savioli and J. Ba, *On the seismic response of a periodic sequence of three thin layers saturated by two-phase fluids* **Geophysics 86 (5) :https://doi.org/(10.1190/GEO2020-0668.1** (2021).

[97] G.B. Savioli, J. M. Carcione, J. E. Santos, P. M. Gauzellino, A. Ravecca and A. Moras, *A numerical simulation of the COVID-19 epidemic in Argentina using the SEIR model*, Latin Amer. Appl. Res. **51 (3) 179–184 :https://doi.org/10.52292/j.laar.2021.671** (2021), 179–184.

[96] J. E. Santos, J. M. Carcione and J. Ba, *Existence and uniqueness of solutions of thermo-poroelasticity*, J. Math. Anal. and Appl., **49 (1) https://doi.org/10.11016/j.jmaa.2020.124907** (2021).

[95] S. Picotti, J. M. Carcione, J. E. Santos, D. Gei and F. Cavallini,, *Finite element experiments of seismic attenuation in finely layered media*, J. Acoust. Soc. Am. **148 (4) https://doi-org.ezproxy.lib.purdue.edu/10.1121** (2020), 1978-1983.

[94] J. M. Carcione, J. E. Santos, C. Bagaini and J. Ba,, *A simulation of a COVID-19 epidemic based on a deterministic SEIR model*, Frontiers in Public Health **49 (1) doi =10.3389/fpubh.2020.00230**.

[93] J. M. Carcione, D. Gei, J. E. Santos, L-Y. Fu and J. Ba,, *Canonical analytical solutions of wave-induced thermoelastic attenuation*, Geophysical Journal International **221** (2020), 835 - 842.

[92] L. A. Macias, J. E. Santos, G. B. Savioli and J. M. Carcione,, *Microseismicity caused by injection of water in a gas-saturated reservoir*, Geophysics **84** (2019), KS183-KS189.

[91] J. E. Santos, G. B. Savioli, J. M. Carcione and J. Ba,, *Effect of capillarity and relative permeability on Q anisotropy of hydrocarbon source rocks*, Geophysical Journal International **218** (2019), 1199 - 1209.

[90] K. Shukla, J. M. Carcione, P. Jaiswal, J. E. Santos and J. Ba, *Effect of capillary pressure on seismic velocities and attenuation*, Journal of Porous Media **22** (2019), 447-466.

[89] J. E. Santos and G. B. Savioli, *Long-wave equivalent viscoelastic solids for porous rocks saturated by two-phase fluids jour Geophysical Journal International* **214** (2018), 302-314.

[88] J. E. Santos., R. Martínez Corredor and J. M. Carcione, *Determination of a transversely isotropic medium equivalent to a fractured fluid-saturated poroelastic medium. A finite element approach*, SIAM Journal on Scientific Computing (SISC), **39 (2)** (2017), B244-B271.

[87] G. B. Savioli, J. E. Santos, J. M. Carcione and D. Gei, *A model for CO_2 storage and seismic monitoring combining multiphase fluid flow and wave propagation simulators. The Sleipner-field case.*, Computational Geosciences **DOI: 10.1007/s10596-016-9607-y** (2016).

[86] R. Martínez Corredor, J. E. Santos., P. M. Gauzellino and J. M. Carcione, *Validation of the boundary conditions to model the seismic response of fractures*, Geophysical Prospecting **64 DOI: 10.1111/1365-2478.12375** (2016), 1149-1165.

[85] Juan E. Santos and Gabriela B. Savioli, *Erratum: A parametric analysis of waves propagating in a porous solid saturated by a three-phase fluid*, the Journal of the Acoustical Society of America **139** (2016), 3121.

[84] Juan E. Santos and Gabriela B. Savioli, *A model for wave propagation in a porous solid saturated by a three-phase fluid*, the Journal of the Acoustical Society of America **139 (2)** (2016), 693-702.

[83] Juan E. Santos and Gabriela B. Savioli, *A parametric analysis of waves propagating in a porous solid saturated by a three-phase fluid*, the Journal of the Acoustical Society of America **138 (5)** (2015), 3033-3042.

[82] Lucas A. Macias, Gabriela B. Savioli, Juan E. Santos, José M. Carcione and Davide Gei, *Analysis of capillary pressure effect on the seismic response of a CO_2-storage site applying multiphase flow and wave propagation simulators*, International Journal of Greenhouse Gas Control **39** (2015), 335-348.

[81] J. E. Santos and J. M. Carcione, *Finite-element harmonic experiments to model fractured induced anisotropy in poroelastic media*, Computer Methods in Applied Mechanics and Engineering (avalaible on line august 27th 2014) **283** (2015), 1189-1213.

[80] R. Martinez Corredor, J. E. Santos., P. M. Gauzellino and J. M. Carcione, *Reflection and transmission coefficients of a single layer in poroelastic media*, Journal of the Acoustical Society of America **135 (6)** (2014), 3151-3162.

[79] J. E. Santos, R. Martinez Corredor and J. M. Carcione, *Seismic velocity and Q anisotropy in fractured poroelastic media*, International Journal of Rock Mechanics and Mining Sciences **70** (2014), 212-218.

[78] P. M. Gauzellino, J. M. Carcione, J. E. Santos and S. Picotti, *A rheological equation for anisotropic-anelastic media and simulation of synthetic seismograms*, Wave Motion **51 (5)** (2014), 743–757.

[77] J. M. Carcione, S. Picotti, J. E. Santos, A. Qadrouh and H. Almaki, *Numerical simulation of two-phase fluid flow*, Journal of Petroleum Exploration Production Technology, **DOI**: 10.1007/s13202-014-0109-y (2014).

[76] J. E. Santos, P. M. Gauzellino, G. B. Savioli and R. Martınez Corredor, *Numerical Simulation in Applied Geophysics. From the Mesoscale to the Macroscale*, Journal of Computational Science and Technology **13 (3)** (2013), 137-1420.

[75] José M. Carcione, Boris Gurevich, Juan E. Santos and Stefano Picotti, *Angular and frequency dependent wave velocity and attenuation in fractured porous media*, Pure and Applied Geophysics **170 DOI: 10.1007/s00024-012-0636-8** (2013), 1673-1683.

[74] J. M. Carcione, S. Picotti and J. E. Santos, *Numerical experiments of fracture-induced velocity and attenuation anisotropy*, Geophysical Journal International **191** (2012), 1179-1191.

[73] J. E. Santos S. Picotti and J. M.Carcione, *Evaluation of the stiffness tensor of a fractured medium with harmonic experiments*, Computer Methods in Applied Mechanics and Engineering **247-248** (2012), 130-145.

[72] J. E. Santos, F. I. Zyserman and P. M. Gauzellino, *Numerical electroseismic modeling. A finite element approach*, Applied Mathematics and Computations **218 (DOI:10.1016/j.amc.2011.12.003)** (2012), 6351-6374.

[71] S. Picotti, J. M. Carcione, D. Gei, G. Rossi and J. E. Santos, *Seismic modeling to monitor CO_2 geological storage: The Atzbach-Schwanenstadt gas field*, Journal of Geophysical Research **117 (DOI: 10.1029/2011JB008540)** (2012), B06103 (1-18).

[70] S. Picotti, J. M.Carcione and J. E. Santos, *Oscillatory numerical experiments in finely layered anisotropic viscoelastic media*, Computers & Geosciences **43** (2012), 83-89.

[69] J. M.Carcione, J. E. Santos and S. Picotti, *Fracture-induced anisotropic attenuation*, Rock Mechanics and Rock Engineering **45 (DOI 10.1007/s00603-012-0237-y)** (2012), 929-942.

[68] J. M.Carcione, S. Picotti, F. Cavallini and J. E. Santos, *Numerical test of the Schoemberg-Muir theory*, Geophysics (10.1190/GEO2011-0228.1) **77 (3)** (2012), 1-9.

[67] F. I. Zyserman, P. M. Gauzellino and J. E. Santos, *Numerical evidence of gas hydrate detection by means of electroseismics*, Journal of Applied Geophysics **86** (2012), 98-108.

[66] J. M. Carcione, J. E. Santos and S. Picotti, *Anisotropic poroelasticity and wave-induced fluid flow. Harmonic finite-element simulations*, Geophysics Journal International **186** (2011), 1245-1254.

[65] J. E. Santos, J. M. Carcione and S. Picotti, *Viscoelastic-stifness tensor of anisotropic media from oscillatory numerical experiments*, Computer Methods in Appl. Mech. and Engrg. **200** (2011), 896-904.

[64] F. I. Zyserman, P. M. Gauzellino and J. E. Santos, *Finite element modeling of SHTE and PVSTM electroseismics*, Journal of Applied Geophysics **72 (2) DOI: 10.1016/j.jappgeo.2010.07.004** (2010), 79-91.

[63] J. M. Carcione, C. Morency and J. E. Santos, *Computational Poroelasticity*, Geophysics **75 (5) (DOI 10.1190/1.3474602)** (2010), 75A229-75A243.

[62] S. Picotti, J. M. Carcione, J. E. Santos and D. Gei, *Q-anisotropy in finely-layered media*, Geophysical Research Letters **37** (2010), L06302 (1-6).

[61] S. Picotti, J. M. Carciones, J. G. Rubino, J. E. Santos and F. Cavallini, *A viscoelastic representation of wave attenuation in porous media*, Computers & Geosciences **36** (2010), 44-53.

[60] J. E. Santos, *Finite element approximation of coupled seismic and electromagnetic waves in fluid-saturated poroviscoelastic media*, Numerical Methods for Partial Differential Equations **27 (2) (DOI: 10.1002/num20527)** (2009), 351-386.

[59] J. E. Santos, J. G. Rubino and C. L. Ravazzoli, *A numerical upscaling procedure to estimate effective bulk and shear moduli in heterogeneous fluid-saturated porous media*, Computer Methods in Applied Mechanics and Engineering **198** (2009), 2067-2077.

[58] P. M. Gauzellino, F. I. Zyserman and J. E. Santos, *Nonconforming finite element methods for the three dimensional Helmholtz equation: iterative domain decomposition of global solution?*, Journal of Computational Acoustics **17 (2)** (2009), 159-173.

[57] J. G. Rubino, C. L. Ravazzoli and J. E. Santos, *Equivalent viscoelastic solids for heterogeneous fluid-saturated porous rocks*, Geophysics **74 (1)** (2009), N1-N13.

[56] L. Guarracino and J. E. Santos, *Hydraulic conductivity estimation in partially saturated soils using a full-Newton method*, Communications in Numerical Methods in Engineering **24** (2008), 1741-1751.

[55] J. E. Santos and D. Sheen, *Derivation of a Darcy's law for composite porous solids using a homogenization technique*, Transport in Porous Media (DOI 10.1007/s11242-007-9204-6) **74 (3)** (2008), 349–368.

[54] P. M. Gauzellino, F. I. Zyserman and J. E. Santos, *A study of ultrasonic wave propagation in bones*, Latin American Applied Research **38** (2008), 361-368.

[53] J. G. Rubino, C. L. Ravazzoli and J. E. Santos, *Biot-type scattering effects in gas-hydrate bearing sediments*, J. Geophys. Res., Solid Earth, **113**, B06102, DOI:10.1029/2006JB004871 (2008), 1-16.

[52] F. I. Zyserman and J. E. Santos, *Analysis of the numerical dispersion of waves in saturated poroelastic media*, Computer Methods in Applied Mechanics and Engineering **196** (2007), 4644-4655.

[51] S. Picotti, J. M. Carcione, J. G. Rubino and J. E. Santos, *P-wave seismic attenuation by slow-wave diffusion: Numerical experiments in partially saturated rocks*, Geophysics **72** (2007), N11–N21.

[50] J. G. Rubino, J. E. Santos, S. Picotti and J. M. Carcione, *Simulation of upscaling effects due to wave-induced fluid flow in Biot media using the finite-element method*, Journal of Applied Geophysics **62** (2007), 193–203.

[49] J. E. Santos and D. Sheen, *Finite element methods for the simulation of waves in composite saturated poroviscoelastic materials*, SIAM J. Numer. Anal. **45 (1)** (2007), 389–420.

[48] J. M. Carcione, O. Campanella and J. E. Santos, *A poroelastic model for wave propagation in partially frozen orange juice*, Journal of Food Engineering (DOI:10.1016/j.jfoodeng.2006.04.044) **80** (2007), 11–17.

[47] J. G. Rubino, C. L. Ravazzoli and J. E. Santos, *Reflection and transmission of waves in composite porous media: a quantification of slow waves conversions*, J. Acoust. Soc. Amer. **120 (5)** (2006), 2425–2436.

[46] J. E. Santos, Y. Efendiev and L. Guarracino,, *Hydraulic conductivity estimation in variable saturated soils using the adjoint method*, Computer Methods in Applied Mechanics and Engineering (DOI:10.1016/j.cma.2006.03.004) **196** (2006), 161–179.

[45] J. E. Santos, C. L. Ravazzoli and J. Geiser, *On the static and dynamic behavior of fluid saturated composite porous solids; a homogenization approach*, International Journal of Solids and Structures **43** (2005), 1224–1238.

[44] C. L. Ravazzoli and J. E. Santos, *A theory for wave propagation in porous rocks saturated by two-phase fluids under variable pressure conditions*, Bollettino di Geofisica teorica ed applicata **46 (4)** (2005), 261–285.

[43] J. E. Santos, C. L. Ravazzoli, P. M. Gauzellino and J. M. Carcione, *Numerical simulation of ultrasonic waves in reservoir rocks with patchy saturation and fractal petrophysical properties*, Computational Geosciences (ISSN 1420-0597, DOI 10.1007/s10596-005-2489-9) **9** (2005), 1–27.

[42] J. M. Carcione, H. B. Helle, J. E. Santos and C. L. Ravazzoli, *a constitutive equation and generalized Gassmann modulus for multi-mineral porous media*, Geophysics **70 (2)** (2005), N17–N26.

[41] J. E. Santos, C. L. Ravazzoli and J. M. Carcione, *A model for wave propagation in a composite solid matrix saturated by a single-phase fluid*, Journal of the Acoustical Society of America **115 (6)** (2004), 2749-2760.

[40] J. E. Santos, C. L. Ravazzoli, P. M. Gauzellino, J. M. Carcione and F. Cavallini, *Simulation of Waves in Poro-viscoelastic Rocks Saturated by Immiscible Fluids. Numerical Evidence of a Second Slow Wave*,

Journal of Computational Acoustics **12 (1)** (2004), 1–21.

[39] L. Guarracino and J. E. Santos, *Stochastic modeling of variably saturated flow in fractal porous media*, Mathematical Geology **36 (2)** (2004), 239–260.

[38] J. M. Carcione, F. Cavallini, J. E. Santos, C. L. Ravazzoli and P. M. Gauzellino, *Wave propagation in partially–saturated porous media: Simulation of a second slow wave*, Wave Motion **39** (2004), 227–240.

[37] J. M. Carcione, J. E. Santos, C. L. Ravazzoli and H. B. Helle, *Wave simulation in partially frozen porous media with fractal freezing conditions*, Journal of Applied Physics **94 (12)** (2003), 7839–7847.

[36] C. L. Ravazzoli, J. E. Santos and J. M. Carcione,, *Acoustic and mechanical response of reservoir rocks under variable saturation and effective pressure*, Journal of the Acoustical Society of America **113** (2003), 1801–1811.

[35] Fabio I. Zyserman, Patricia M. Gauzellino and Juan E. Santos, *Dispersion analysis of a nonconforming finite element method for the Hemholtz and elastodynamic equations*, International Journal for Numerical Methods in Engineering **58** (2003), 1381–1395.

[34] T. Ha, J. E. Santos and D. Sheen, *Nonconforming finite element methods for the simulation of waves in viscoelastic solids*, Computer Methods in Applied Mechanics and Engineering **191(49-50)** (2002), 5647–5670.

[33] J. E. Santos, *On the solution of an inverse scattering problem in seismic while-drilling technology*, Computer Methods in Applied Mechanics and Engineering **191** (2002), 2403–2425.

[32] E. M. Fernández Berdaguer, L. V. Perez and J. E. Santos, *Numerical Experiments on parameter estimation in acoustic media using the adjoint method*, Latin American Applied Research **32 (4)** (2002), 337–342.

[31] J. Kohn, E. Kruse and J. E. Santos, *Hidrogeologic behavior of an alluvial aquifer, Salta Province, Argentina: Simulations of hydraulic conductivity field, groundwater flow and chloride migration*, Natural Resources Research, **11 (3)** (2002), 157–166.

[30] Z.Cai, J. Douglas, Jr., J. E. Santos, D. Sheen, and X. Ye, *Nonconforming quadrilateral finite elements: A correction*, Calcolo **37** (2001), 253–254.

[29] J. Douglas, Jr., J. E. Santos and D. Sheen, *Nonconforming Galerkin Methods for the Helmholtz equation*, Numerical Methods for Partial Differential Equations **7** (2001), 475–494.

[28] P. M. Gauzellino and J. E. Santos, *Frequency domain wave propagation modeling in exploration seismology*, Journal of Computational Acoustics **9** (2001), 941–955.

[27] F. I. Zyserman and J. E. Santos, *Parallel finite element algorithm for three–dimensional magnetotelluric modelling*, Journal of Applied Geophysics **44** (2000), 337-351.

[26] J. Douglas, Jr., J. E. Santos, and D. Sheen, *A nonconforming mixed finite element method for Maxwell's equations*, Mathematical Models and Methods in Applied Sciences **10** (2000), 593–613.

[25] J. E. Santos and D. Sheen, *On the existence and uniqueness of Maxwell's equations in bounded domains with application to magnetotellurics*, Mathematical Models and Methods in Applied Sciences **10** (2000), 615–628.

[24] L. Guarracino, L. Candela Lledó and J. E. Santos,, *Modelado y análisis del transporte del herbicida Glifosato en una parcela experimental del Maresme (Barcelona, España)*, Hidrología Subterránea, ISSN 1514-4186, Serie de Correlación Geológica Nro. 13 (1999), 61–70.

[23] F. I. Zyserman, L. Guarracino and J. E. Santos, *A hybridized mixed finite element domain decomposed method for two-dimensional magnetotelluric modelling*, Earth, Planets and Space **51** (1999), 297–306.

[22] J. Douglas, Jr., J. E. Santos, D. Sheen, and X. Ye, *Nonconforming Galerkin methods based on quadrilateral elements for second order elliptic problems*, Math. Modelling and Numer. Anal. **33** (1999), 747–770.

[21] J. E. Santos and D. Sheen, *Global and parallelizable domain-decomposed mixed finite element methods for three-dimensional electromagnetic modelling*, Computational and Applied Mathematics **17** (1998), 265–282.

[20] J. E. Santos, *Global and domain-decomposed mixed methods for the solution of Maxwell's equations with application to magnetotellurics*, Numerical Methods for Partial Differential Equations **14** (1998), 407-437.

[19] E. Fernández, J. E. Santos, and D. Sheen, *An iterative procedure for estimation of variable coefficients in a hyperbolic system*, Applied Mathematics and Computation **76** (1996), 210–250.

[18] E. Fernández and J. E. Santos, *On the solution of an inverse scattering problem in one-dimensional acoustic media*, Computer Methods in Applied Mechanics and Engineering **129** (1996), 91–105.

[17] E. Fernández, P. Gauzellino, and J. E. Santos, *An algorithm for parameter estimation in acoustic media, practical issues*, Latin American Applied Research **25** (1995), 161–168.

[16] C. L. Ravazzoli and J. E. Santos, *Consistency analysis for a model for wave propagation in anelastic media*, Latin American Applied Research **25** (1995), 141–152.

[15] M. G. Armentano, E. M. Fernández-Berdaguer, and J. E. Santos, *A frequency domain parameter estimation procedure in viscoelastic layered media*, Computational and Applied Mathematics **14** (1995), 191–216.

[14] J. Douglas, Jr., J. E. Santos, and D. Sheen, *Approximation of scalar waves in the space-frequency domain*, Mathematical Models and Methods in Applied Sciences **4** (1994), 509–531.

[13] P. Gauzellino and J. E. Santos, *Numerical methods for wave propagation in elastic and anelastic media*, Computational and Applied Mathematics **12** (1993), 95–112.

[12] J. Douglas, Jr., J. E. Santos, D. Sheen, and L. S. Bennethum, *Frequency domain treatment of one-dimensional scalar waves*, Mathematical Models and Methods in Applied Sciences **3** (1993), 171–194.

[11] J. E. Santos, J. M. Corberó, C. L. Ravazzoli, and J. L. Hensley, *Reflection and transmission coefficients in fluid-saturated porous media*, J. Acoust. Soc. of America **91** (1992), 1911–1923.

[10] J. E. Santos, *Numerical simulation of waves in fluid-saturated porous media*, Latin American Applied Research **21** (1991), 267–274.

[9] J. E. Santos, J. M. Corberó, and J. Douglas, Jr., *Static and dynamic behaviour of a porous solid saturated by a two-phase fluid*, J. Acous. Soc. Am. **87** (1990), 1428–1438.

[8] J. E. Santos, J. Douglas, Jr., J. Corberó, and O. M. Lovera, *A model for wave propagation in a porous medium saturated by a two-phase fluid*, J. Acoustical Soc. Amer. **87** (1990), 1439–1448.

[7] J. E. Santos, J. Douglas, Jr., M. E. Morley, and O. M. Lovera, *Finite element methods for a model for full waveform acoustic logging*, IMA Journal of Numerical Analysis **8** (1988), 415–433.

[6] O. M. Lovera and J. E. Santos, *Numerical methods for a model for wave propagation in composite anisotropic media*, Modélisation Mathematique et Analyse Numerique **22** (1988), 159–176.

[5] J. E. Santos, J. Douglas, Jr., and A. P. Calderón, *Finite element methods for a composite model in elastodynamics*, SIAM J. Numer. Anal. **25** (1988), 513–532.

[4] J. E. Santos and E. J. Oreña, *Elastic wave propagation in fluid-saturated porous media, Part II: The Galerkin Procedures*, Math. Modelling and Numer. Anal. **20** (1986), 129–139.

[3] J. E. Santos, *Elastic wave propagation in fluid-saturated porous media, Part I: The existence and uniqueness theorems*, Math. Modelling and Numer. Anal. **20** (1986), 113–128.

[2] J. E. Santos, *Finite element methods for the approximate solution of the linear viscoelastic wave equation*, Matemática Aplicada e Computacional **4** (1985), 35–48.

[1] J. E. Santos, *Finite element methods for the simulation of wave propagation in two–dimensional elastic media*, Thesis, University of Chicago, 1983, Calcolo **22** (1985), 249–317.

Refereed Conference Proceedings

[95] N. D. Arenas, G. B. Savioli, J. E. Santos and J. M. Carcione, *Numerical experiments to characterize P-wave attenuation in partially saturated non-isothermal porous media.*, Third International Meeting for Applied Geoscience & Energy (2023) Society of Exploration Geophysicists and the American Association of Petroleum Geologists Expanded Abstracts, (1372-1375) ,(2023).

[94] J. E. Santos, J M. Carcione, G. B. Savioli, J. M. Carcione and J. Ba, *Effective wave dispersion and attenuation in three-periodic thin poroelastic layers saturated by twophase fluids*, Second International Meeting for Applied Geoscience & Energy International Meeting (2022) Society of Exploration Geophysicists and the American Association of Petroleum Geologists Expanded Abstracts, (2547-2551) ,(2022).

[93] J. E. Santos, J M. Carcione, G. B. Savioli, P. M. Gauzellino and J. Ba, *Effective wave dispersion and attenuation in three-periodic thin poroelastic layers saturated by two-phase fluids*, 91 Annual International Meeting 2021 SEG Expanded Abstracts, (2425-2429) ,(2021).

[92] J. E. Santos, J M. Carcione, P. M. Gauzellino and G. B. Savioli, *Effective P-and-S-wave moduli in finely layered thermoelastic media*, 90 Annual SEG International Exposition and 90th Annual Meeting International, 2020 Society of Exploration Geophysicists Expanded Abstracts, (2585-2589) ,(2020).

[91] N. Arenas, P. M. Gauzellino, G. B. Savioli and J. E. Santos, *Modeling fracture propagation, seismic identification and gas production in shale reservoirs*, 90 Annual International Meeting 2020 SEG Expanded Abstracts, (2201-2205),(2020).

[90] N. Arenas, G. B. Savioli, P. M. Gauzellino and J. E. Santos, *Characterization of unconventional reservoirs using multiphase flow and seismic wave propagation,*, Mecánica Computacional Vol. XXXV, pp. 1715-1722, A. Cardona, L. Garelli, J.M. Gimenez, P.A. Kler, S. Marquez Damian, M.A. Storti (Eds.), Santa Fe, Argentina, 5-7 Noviembre 2019.

[89] Y. Wei, J. Ba, L-Y. Fu, J. M. Carcione, A. Vesnaver and J. E. Santos, *Effect of differential pressure on the pore structure and wave response of tight sandstones*, 89 Annual International Meeting, 2019 SEG Expanded Abstracts, (3693-3697) ,(2019).

[88] K. Shukla, J. M. Carcione, and R. C. Pestana, *An efficient fully spectral method for constant-Q seismic wave propagation,*, 88 Annual International Meeting, 2018 SEG Expanded Abstracts, (3939-3942) ,(2018).

[87] J. E. Santos, G. B. Savioli, L. A. Macias and J. M. Carcione,, *Sensitivity analysis of the petrophysical properties variations on the seismic response of a CO_2 storage site,*, 87 Annual International Meeting (Houston, Texas), 2017 SEG Expanded Abstracts, (4190-4194) ,(2017).

[86] R. Martinez Corredor and J. E. Santos,, *Long-wave anisotropic behavior of highly heterogeneous fractured Biot media,*, 87 Annual International Meeting (Houston, Texas), 2017 SEG Expanded Abstracts, (390-394) ,(2017).

[85] K. Shukla, J. M. Carcione, P. Jaiswal and J. E. Santos,, *Effect of capillary pressure on seismic velocities*, 87 Annual International Meeting (Houston, Texas), 2017 SEG Expanded Abstracts, (4184-4189) ,(2017).

[84] P. M. Gauzellino and J. E. Santos, *Absorbing boundary conditions for 3D anisotropic media Mecánica Computacional Vol. XXXV, pp. 39-47, M. I. Idiart, A. E. Scarabino and M. A. Storti (Eds.), La Plata, Argentina, November 7–10 2017.*.

[83] G. B. Savioli, J. E. Santos, L. A. Macias and P. M. Gauzellino, *A multiscale FEM to model CO_2 sequestration in saline aquifers Mecánica Computacional Vol. XXXV, pp. 1487-1496, M. I. Idiart, A. E. Scarabino and M. A. Storti (Eds.), La Plata, Argentina, November 7–10 2017.*.

[82] J. E. Santos and Robiel Martínez Corredor, *Analysis of Fracture Induced Anisotropy in a Biot Medium as Function of Effective Pressure*, Proceedings of the Sixth Biot Conference on Poromechanics, pp. 1674-1681, Paris, France, July 9-13 (2017).

[81] J. E. Santos, G. B. Savioli and R. Martínez Corredor, *Slow Waves in a Poroelastic Solid Saturated by Multiphase Fluids*, Proceedings of the Sixth Biot Conference on Poromechanics, pp. 1682-1689, Paris, France, July 10-13 (2017).

J. E. Santos, J. E. and G. B. Savioli, Waves in a poroelastic solid saturated by a three-phase fluid, Mecánica Computacional Vol. XXXIV, pp. 3149-3160, S. Giusti, M. Pucheta y M. Storti (Eds.), Córdoba, Argentina, November 8-11 2016..

[79] R. Martínez Corredor and J. E. Santos, Numerical simulation applied to characterize induced anisotropy in densely fractured poroelastic media, Mecánica Computacional Vol. XXXIV, pp. 3075-3086, S. Giusti, M. Pucheta y M. Storti (Eds.), Córdoba, Argentina, November 8-11 2016..

[78] L. A. Macías , J. E. Santos and G. B. Savioli, Induced seismicity in unconventional reservoirs using multiphase fluid-flow simulations, Mecánica Computacional Vol. XXXIV, pp. 3065-3073, S. Giusti, M. Pucheta y M. Storti (Eds.), Córdoba, Argentina, November 8-11 2016..

[77] J. E. Santos, L. A. Macías, G. B. Savioli and J. M. Carcione, *Modeling hydraulic fracturing and induced seismicity in unconventional reservoirs using multiphase fluid-flow simulations*, 85 Annual International Meeting (New Orleans, Lousiana), 2015 SEG New Orleans Expanded Abstracts **DOI http://dx.doi.org/10.1190/segam2015-5838538.1** ,(5053-5057) ,(2015).

[76] J. E. Santos, R. Martínez Corredor and J. M. Carcione, *Aligned fractures modeled as boundary conditions within saturated porous media and induced anisotropy. A finite element approach*, 85 Annual International Meeting (New Orleans, Lousiana), 2015 SEG New Orleans Expanded Abstracts **DOI http://dx.doi.org/10.1190/segam2015-5850278.1** ,(546-550) ,(2015).

[75] J. E. Santos and G. B. Savioli, *A Biot model describing wave propagation in a porous solid saturated by a three-phase fluid*, 85 Annual International Meeting (New Orleans, Lousiana), 2015 SEG New Orleans Expanded Abstracts **DOI http://dx.doi.org/10.1190/segam2015-5724663.1**,(5169-5173) ,(2015).

[74] J. E. Santos, G. B. Savioli, L. A. Macías, J. M. Carcione and D. Gei, *Influence of capillary pressure on CO2 storage and monitoring*, 84 Annual International Meeting (Denver, Colorado), 2014 SEG Denver Expanded Abstracts **DOI http://http://dx.doi.org/10.1190/segam2014-0550.1**,(4971-4975) ,(2014).

[73] L. A. Macias, G. B. Savioli, J. E. Santos, J. M. Carcione and D. Gei, *Capillary pressure sensitivity in modeling CO_2 injection of fractured hydrocarbon reservoirs*, Mecánica Computacional Vol. XXXIII, pp. 429-440, G. Bertolino, M. Cantero, M. Storti and F. Teruel (Eds.), San Carlos de Bariloche, 23-26 Setiembre 2014 Rosario, Argentina.

[72] R. Martinez Corredor , P. M. Gauzellino, J. E. Santos and R. S. Hawryszczuk, *Numerical Rock Physics and seismic characterization of fractured hydrocarbon reservoirs*, Mecánica Computacional Vol. XXXIII, pp. 2201-2216, G. Bertolino, M. Cantero, M. Storti and F. Teruel (Eds.), San Carlos de Bariloche, 23-26 Setiembre 2014 Rosario, Argentina.

[71] G. B. Savioli, J. E. Santos, J. M. Carcione and D. Gei, *Seismic monitoring of CO_2 storage considering wave attenuation and dispersion effects*, MACI 4 (2103), pp. 355-358, G. La Mura, D. Rubio, E. Serrano (Eds.).

[70] L. A. Macias, G. B. Savioli and J. E. Santos, *Numerical simulation in unconventional reservoirs*, Mecánica Computacional Vol XXXII, pp. 1259-1270 Carlos G. García Garino, Aníbal E. Mirasso, Mario A. Storti, Miguel E. Tornello (Eds.) Mendoza, Argentina, 19-22 Noviembre 2013.

[69] J. E. Santos, J. M. Carcione and S. Picotti,, *Determination of the stiffness tensor of a fractured medium using finite element simulations*, 82 Annual International Meeting (Las Vegas, Nevada), SEG Expanded Abstracts **DOI http://dx.doi.org/10.1190/segam012-0272-1**, (1-5), (2012).

[68] G.B. Savioli, J. E. Santos, J. M. Carcione and D. Gei,, *Numerical Modeling of Fluid Fow and Time-Lapse Seismograms Applied to CO_2 Storage and Monitoring*, Proceedings of the 10th World Congress on Computational Mechanics, 8-13 July 2012, Sao Paulo, Brazil..

[67] G.B. Savioli and J. E. Santos,, *Integrated fluid-flow and time-lapse seismics to monitor carbon dioxide sequestration*, Mecánica Computacional Vol. XXX, pp. 2877-2890, O. Moller,J. W. Signorelli and M. Storti (Eds.), Rosario, Argentina, November 1-4, 2011.

[66] J. E. Santos and J. M. Carcione,, *A finite-element procedure to determine Biot's coefficients of anisotropic poroelasticity*, Mecánica Computacional Vol. XXX, pp. 2863-2876, O. Moller,J. W. Signorelli and M. Storti (Eds.), Rosario, Argentina, November 1-4, 2011.

[65] J. E. Santos, J. M. Carcione and S. Picotti,, *Analysis of mesoscopic loss effects in anisotropic poroelastic media using harmonic finite element simulations*, 81 Annual International Meeting (San Antonio, Texas), SEG Expanded Abstracts 30, 2211-2215 (2011).

[64] G. B. Savioli and J. E. Santos, Modeling of CO2 Storage in Aquifers, FLUIDOS 2010: XI Meeting on Recent Advances in the Physics of Fluids and their Applications, Volume 296, Journal of Physics: Conference Series, Volume 296, 012014. http://dx.doi.org/10.1088/1742-6596/296/1/012014[dx.doi.org].

[63] F. I. Zyserman, J. E. Santos and P. M. Gauzellino, Electroseismic monitoring of CO_2 sequestration: A finite element approach, MACI, (3), 2011, 307-310, III Congreso de Matemática Aplicada, Computacional e Industrial, MACI 2011, Bahía Blanca, Argentina, may 9-11, 2011.

[62] G. B. Savioli and J. E. Santos, Numerical Methodology to model and monitor CO2 sequestration, MACI, (3), 2011, 319-322, III Congreso de Matemática Aplicada, Computacional e Industrial, MACI 2011, Bahía Blanca, Argentina, may 9-11, 2011.

[61] P. M. Gauzellino, J. E. Santos and F. I. Zyserman, *Numerical simulation of sismoelectrograms*, Mecánica Computacional Vol. XXIX, pp. 2309-2322, E. Dvorkin, M. Goldsmicht, M. Storti (Eds.), Buenos Aires, Argentina, November 15-18, 2010.

[60] J. E. Santos, S. Picotti and J. M. Carcione,, *Determination of the stiffness tensor of transversely viscoelastic media using numerical oscillatory experiments*, 80th Annual International Meeting (Denver, Colorado), SEG Expanded Abstracts 29, 197-200 (2010).

[59] J. E. Santos and F. I. Zyserman, Analysis of 2D time-domain seismoelectric modeling, MACI, (2), 2009, 225–228, II MACI 2009, II Congreso de Matemática Computacional e Industrial, Rosario, Argentina, december 14–16, 2009.

[58] S. Picotti, J. E. Santos, J. M. Carcione, D. Gei and C. L. Ravazzoli, *A physics and seismic numerical methodology for modelling CO2 geological storage*, SEG 2009 Summer Research Workshop on CO2 Sequestration Geophysics, Espanded Abstracts, Section 4: Geophysical modelling of CO2 injection -simulations, Banff, Canada, 23-27 August 2009..

[57] S. Picotti, J. E. Santos, J. M. Carcione, D. Gei and C. L. Ravazzoli, *A finite element method to model attenuation and dispersion effects in highly heterogeneous fluid-saturated porous media*, Proceedings of the 9th International Conference on Theoretical and Computational Acoustics, pp. 235-246, 2009, Dresden, Germany, september 7-10, 2009,Steffen Marburg (Editor), Published by Universitat der Bundeswehr, 85579 Neubiberg, Germany..

[56] J. E. Santos, J. Germán Rubino and C. L. Ravazzoli, *Modeling mesoscopic attenuation in a highly heterogeneous Biot's medium employing an equivalent viscoelastic model*, 78th Annual International Meeting (Las Vegas, Nevada), SEG Expanded Abstracts 27, 2112-2116 (2008).

[55] Patricia M. Gauzellino, Juan E. Santos and Fabio I. Zyserman, *Numerical modeling of coupled seismic and electromagnetic waves in fluid-saturated porous media*, Mecánica Computacional Vol. XXVI, pp. 1653–1672, S. A. Elaskar E. Pilotta and G. A. Torres (Eds.), Córdoba, Argentina, October 2007.

[54] J. Germán Rubino, Claudia L. Ravazzoli and Juan E. Santos, *A Numerical to estimate the effective moduli in highly heterogeneous fluid-saturated porous media*, Mecánica Computacional Vol. XXVI, pp. 1747–1773, S. A. Elaskar E. Pilotta and G. A. Torres (Eds.), Córdoba, Argentina, October 2007.

[53] Juan E. Santos, J. Germán Rubino and Claudia L. Ravazzoli, *Statistical analysis of the effective velocity and mesoscopic attenuation in patchy saturated porous media*, 77th Annual International Meeting (San Antonio, Texas), SEG Expanded Abstracts 26, 2708-2712 (2007).

[52] Fabio I. Zyserman and Juan E. Santos, *Numerical aspects of wave propagation in a Biot medium*, Mecánica Computacional Vol. XXV, pp. 979–992, A. Cardona, N. Nigro , V. Sonzogni and M. Storti (Eds.), Santa Fé, Argentina, November 2006.

[51] Luis Guarracino, Elena M. Fernández Berdaguer and Juan E. Santos, *A Full-Newton algorithm for parameter estimation in unsaturated soils*, Mecánica Computacional Vol. XXV, pp. 1259–1267, A. Cardona, N. Nigro , V. Sonzogni and M. Storti (Eds.), Santa Fé, Argentina, November 2006.

[50] Patricia M. Gauzellino, Juan E. Santos and Fabio I. Zyserman, *Propagación de ondas de ultrasonido en hueso cortical y trabecular*, Mecánica Computacional Vol. XXV, pp. 747–758, A. Cardona, N. Nigro , V. Sonzogni and M. Storti (Eds.), Santa Fé, Argentina, November 2006.

[49] Juan E. Santos, J. Germán Rubino and José M. Carcione, *Numerical simulation of seismic attenuation due to wave-induced fluid flow*, Mecánica Computacional Vol. XXV, pp. 2179–2192, A. Cardona, N. Nigro , V. Sonzogni and M. Storti (Eds.), Santa Fé, Argentina, November 2006.

[48] J. Germán Rubino, Claudia L. Ravazzoli and Juan E. Santos, *Modeling the inversion of sonic P and S wave velocities at the Mallik 5K-38 Gas Hydrate Research Well*, 2006 EAGE/EAGO/SEG Conference and Exhibition A029, Saint Petersburg, Russia.

[47] Juan E. Santos, J. Germán Rubino and Claudia L. Ravazzoli, *Modeling the reflection coefficients and slow wave mode conversions at the top and bottom of a gas-hydrate bearing interval*, 76th Annual International Meeting (New Orlenas, Lousiana), SEG Expanded Abstracts 25, 2986-2989 (2006).

[46] Claudia L. Ravazzoli, J. German Rubino and Juan E. Santos, *Numerical analysis of wavefields in composite frozen porous media*, Mecánica Computacional Vol. XXIV, ISSN 1666-6070, pp. 3131-3147, 2005.

[45] Juan E. Santos and L. Guarracino, *Numerical experiments on hydraulic conductivity estimation using the adjoint method*, Mecánica Computacional Vol. XXIV, ISSN 1666-6070, pp. 3321-3330, 2005.

[44] Juan E. Santos, *A finite element method for the approximation of waves in fluid saturated poroviscoelastic media*, Mecánica Computacional Vol. XXIV, ISSN 1666-6070, pp. 2429-2448, 2005.

[43] Juan E. Santos and Claudia L. Ravazzoli, *A domain decomposition procedure for the simulation of waves in fluid saturated composite poroviscoelastic media*, Mecánica Computacional Vol. XXI, pp. 3191–3209, , G. C. Buscaglia, E. A. Dari and O. M. Zamonsky (eds.), Bariloche, Argentina, Noviembre 2004.

[42] Juan E. Santos, Patricia M. Gauzellino and Claudia L. Ravazzoli, *Numerical simulation of waves in poroviscoelastic rocks saturated by immiscible fluids*, Mecánica Computacional Vol. XXI, pp. 652–669, S. R. Idelsohn, V. E. Sonsogni and A. Cardona (eds.), Santa Fé- Paraná, Argentina, October 2002..

[41] J. E. Santos, C. L. Ravazzoli, J. M. Carcione, P. M. Gauzellino and F. Cavallini, *Prediction and simulation of a second slow wave in partially saturated porous media*, Extended Abstract of 64th Conference and Exhibition of the European Association of Geophysicists and Engineers (EAGE 64th Conference & Exhibition), Florence, Italy, may 27–30, 2002.

[40] P. M. Gauzellino, J. E. Santos y F. I. Zyserman, *Análisis del comportamiento de algoritmos paralelos de elementos finitos con descomposición de dominio en aplicaciones geofísicas*, Mecánica Computacional Vol. 20 pp. 474–481. Córdoba, October 30th–Novermer 2nd, 2001..

[39] J. E. Santos, P. M. Gauzellino and F. I. Zyserman, *An algorithm for 3D seismic inversion*, Mecánica Computacional Vol. 20 pp. 569–576, Córdoba, October 30th–Novermer 2nd, 2001..

[38] C. L. Ravazzoli, J. M. Carcione, J. E. Santos and H. Helle, *Acoustic properties of an overpressured sandstone saturated by inmiscible fluids*, Extended Abstracts of the SEG meeting in San Antonio, Texas, September 9–14, 2001, paper 543.

[37] P. M. Gauzellino, F. Zyserman and J. E. Santos, *Modeling wave propagation on parallel computers*, Extended Abstracts of the SEG meeting in San Antonio, Texas, September 9–14, 2001, paper 476.

[36] L. Guarracino y J. E. Santos, *Stochastic modeling of unsaturated flow in fractal porous media*, Proceedings of the XXXI IAHS Congress, New Approaches to Characterizing Groundwater Flow, Munich, Germany, September 10–14, 2001, pp. 339–342.

[35] J. Kohn, E. Kruse and J. E. Santos, *Led Contamination of groundwater in the notheast of Buenos Aires Province, Argentina*, Maastrich Sixth IAHS Scientific Assembly symposium proceedings: Impact of Human Activity on Groundwater Dynamics, IAHS Publ. No 269, 2001, pp. 323–329.

[34] L. Guarracino y J. E. Santos, *A Monte Carlo Simulation of Water Flow in Variably Saturated Porous Media*, Mecánica Computacional **19** (2000), 471–476.

[33] J. Douglas, Jr., J. E. Santos, and D. Sheen, *A nonconforming mixed method for the time-harmonic Maxwell equations*, Proceedings of WAVES2000, an INRIA-SIAM conference in Santiago de Compostela, Spain, July 10-14, 2000, pp. 792–796.

[32] J. Kohn, E. Kruse y J. Santos, *Modelado en geofísica aplicado al transporte de nitrato en aguas subterráneas*, Proceedings del 1st Joint World Congress on Groundwater, Fortaleza, Brazil, August 2000, (6 pages)..

[31] J. Kohn, E. Kruse and J. Santos, *Modelacin de variabilidad de la conductividad hidrulica en los sedimentos pampeanos*, Uso y Preservacin de los recursos hdricos en los umbrales del siglo XXI, Memorias del XVIII Congreso Nacional del Agua, H. Farias et al (Eds.), Santiago del Estero, Argentina, 2000, ISBN 987 99083 4 1, pp. 1-6..

[30] J. Kohn, E. Kruse and J. Santos, *Movement of nitrates in shallow aquifer*, Groundwater Research, Rosbjerg et al. (eds.), Balkema, Rotterdam, 2000, ISBN 90 5809 133 3, pp. 1-2.

[29] J. Kohn, E. Kruse y J. Santos, *Transporte de cloruro en Acuferos Aluviales*, Memorias de Geoinfo, C. M: Bustamante Allen, J. A. Garcia Peláez, B.Ballagas Flores, A. Quintana Garmendía (Eds.), ISSN 1028-8961, Ciudad de La Habana, Cuba, 2000, pp 1–7.

[28] C.L. Ravazzoli, J.E. Santos, *Compressibility analysis of Berea sandstone versus saturation and effective pressure*, 62nd. European Association of Geoscientists and Engineers Conference and technical

Exhibition Extended Abstracts, volume 1 (paper D-36), Glasgow (Scotland), May 29th – June 2nd, 2000.

[27] J. Kohn, E. Kruse y J. E. Santos, *Behaviour of contaminant plumes at the interface between the Pampeano and Puelche aquifers in the Province of Buenos Aires, Argentina*, Interdisciplinary Perspectives on Drinking Water Risk Assesement and Management (Eric G. Reichard, Fred S. Hauchman and Ana Maria Sancha, ed.), International Association of Hydrological Sciences (IAHS) Publication Number 260, ISBN 1–901502–11–2, IAHS Press, Institute of Hydrology, Wallingford, Oxfordshire OX10 8BB,UK, 2000, pp. 81–86.

[26] F. I. Zyserman and J. E. Santos, *3D forward magnetotelluric modelling: a new parallel finite element method*, Proceedings of the Second International Symposium on Three–Dimensional Electromagnetics (3DEM-2) , University of Utah, Salt Lake City, 1999,pp 107-110..

[25] J. Kohn, E. Kruse and J. E. Santos, *Migración de solutos en formaciones porosas saturadas*, Proceedings of the VI International Congress of the Brazilian Geophysical Society, Rio de Janeiro, Brazil, august 16–19 1999, (CD-Proceedings, paper SBGf07599, 4 pages).

[24] L. Guarracino, L. Candela Lledó and J. E. Santos, *Simulación numérica del transporte del herbicida Glifosato en la zona no saturada*, Estudios de la Zona no Saturada del Suelo, ICIA: Tenerife. ISBN 84–699–1258–5, R. Muñoz-Carpena, A. Ritter, C. Tascón (ed.), 1999, pp. 151–155.

[23] L. Guarracino, C. L. Ravazzoli, and J. E. Santos, *Modelado de transporte de contaminantes en las zonas saturada y no saturada utillizando metodos de elementos finitos*, Memorias del IV Congreso Latinoamericano de Hidrología Subterránea, Montevideo, Uruguay, November 16th–20th, 1998, pp. 156–168.

[22] L. Guarracino, E. Kruse, J. E. Santos, and R. Tanco, *Simulation of infiltration and water table variations in a flatland in Buenos Aires Province (Argentina)*, Proceedings of the XXVIII Congress of the International Association of Hydrogeologists and the Annual Meeting of the American Institute of Hydrogeologists, Las Vegas, September 28th-October 2nd, 1998, Gambling with Groundwater — Physical, Chemical and Biological Aspects of Aquifer-Stream Relations (J. Brahana *et al.*, eds.), pp. 285–289.

[21] J. E. Santos and P. M. Gauzellino, *Parallel algorithms for wave propagation in fluid-saturated porous media*, Computational Mechanics, New Trends and Applications, (S. R. Idelsohn *et al.*, eds.), vol. Section 5, paper 8, 1998, pp. 1-12.

[20] L. Guarracino and J. E. Santos, *Numerical modelling of unsaturated flow using a hybridized mixed finite element procedure*, Computational Mechanics, New Trends and Applications (S. R. Idelsohn *et al.*, eds.), vol. Section 7, paper 5, 1998, pp. 1-10.

[19] J. Kohn, J. Santos, and E. Kruse, *A TVD methods for contaminant transport in porous media*, Computational Mechanics, New Trends and Applications (S. R. Idelsohn *et al.*, eds.), vol. Section 4, paper 2, 1998, pp. 1-8.

[18] F. Zyserman and J. E. Santos, *A parallel algorithm for solving the 3D forward problem in magnetotellurics*, Computational Mechanics, New Trends and Applications (S. R. Idelsohn *et al.*, eds.), vol. Section 5, paper 2, 1998, pp. 1-10.

[17] F. Zyserman, L. Guarracino, and J. E. Santos, *A numerical method for solving the 2D direct problem in magnetotellurics*, Mecánica Computacional **18** (1997), 705–714.

[16] J. E. Santos and P. M. Gauzellino, *Nonconforming iterative domain decomposition procedures for the simulation of waves in fluid-saturated porous solids*, Mecánica Computacional **18** (1997), 657–664.

[15] L. Guarracino and J. E. Santos, *A global hybridized mixed finite element method for infiltration and groundwater flow modelling*, Mecánica Computacional **18** (1997), 595–601.

[14] J. Kohn, M. Kischinhevsky, E. Kruse, and J. E. Santos, *Modelado numérico de transporte de contaminantes en medios porosos saturados*, Proceedings of the 19th Reunión Científica de la Asociación Argentina de Geofísicos y Geodestas, October 28th–31st, 1997, San Juan, Argentina, pp. 321–325.

[13] L. Guarracino, E. Kruse, and J. E. Santos, *Modelado de infiltración y flujo de aguas subterráneas utilizando la ecuación de Richards*, Proceedings of the 19th Reunión Científica de la Asociación Argentina de Geofísicos y Geodestas, October 28th–31st, 1997, San Juan, Argentina, pp. 206–210..

[12] L. Guarracino, E. Kruse, and J. E. Santos, *Simulación de perfiles de flujo y de saturación en la zona no saturada*, Proceedings of the III Seminario Hispano–Argentino sobre temas actuales de Hidrología Subterránea, Bahía Blanca, Argentina, September 9th–12th, 1997, pp. 85–95.

[11] E. M. Fernández-Berdaguer and J. E. Santos, *Estimation of the complex plane-wave modulus in viscoelastic layered media*, Wavelet Theory and Harmonic Analysis in Applied Sciences (E. M. Fernández-Berdaguer and C. E. D'Atellis, eds.), Applied and Computational Harmonic Analysis Series, Birkhauser, 1997, pp. 311–323.

[10] L. Guarracino and J. E. Santos, *Numerical modelling of Maxwell's equations with application to magnetotellurics*, Wavelet Theory and Harmonic Analysis in Applied Sciences (E. M. Fernández-Berdaguer and C. E. D'Atellis, eds.), Applied and Computational Harmonic Analysis Series, Birkhauser, 1997, pp. 325–342.

[9] L. Guarracino and J. E. Santos, *Un método de elementos finitos por descomposición de dominio para modelado magnetotelúrico bidimensional*, Mecánica Computacional **15** (1995), 375–384.

[8] E. Fernández, P. Gauzellino, and J. E. Santos, *An iterative procedure employing quasilinearization for parameter estimation in acoustic media*, Proceedings of the First Latin American Conference and Exposition of the Latin American Geophysical Union and the Fourth International Congress of the Brazilian Geophysical Society, Rio de Janeiro, Brazil, August 20th-24th, 1995, pp. 305–308.

[7] J. Douglas, Jr., F. Pereira, and J. E. Santos, *Parallel numerical simulation of waves in dispersive media*, Proceedings of the First Latin American Conference and Exposition of the Latin American Geophysical Union and the Fourth International Congress of the Brazilian Geophysical Society, Rio de Janeiro, Brazil, August 20th-24th, 1995, pp. 417–419.

[6] J. Douglas, Jr., F. Pereira, and J. E. Santos, *A parallelizable approach to the simulation of waves in dispersive media*, Proceedings of the Third International Conference on Wave Propagation Phenomena (G. Cohen, ed.), SIAM, 1995, pp. 673–682.

[5] J. E. Santos, *Space-frequency domain approximation of waves in dispersive media*, Mecánica Computacional **14** (1994), 106–113.

[4] J. Douglas, Jr., J. E. Santos, J. L. Hensley, and M. E. Morley, *Simulation of waves arising in acoustic well-logging*, Rend. Sem. Mat. Univ. Pol. Torino, Fascicolo Speciale (1991), 223–243.

[3] C. L. Ravazzoli, J. Douglas, Jr., J. E. Santos, and D. Sheen, *On the solution of the equations of motion for nearly elastic solids in the frequency domain*, Anales de la IV Reunión de Trabajo en Procesamiento de la Información y Control, Centro de Cálculo Científico, Comisión Nacional de Energía Atómica, Buenos Aires, Argentina, November 1991, 231-235.

[2] T. Arbogast, J. Douglas, Jr., and J. E. Santos, *Two-phase immiscible flow in naturally fractured reservoirs*, Numerical Simulation in Oil Recovery (Mary F. Wheeler, ed.), The IMA Volumes in Mathematics and its Applications,, vol. 11, Springer-Verlag, Berlin and New York, 1988, pp. 47–66.

[1] J. Douglas, Jr., and J. E. Santos, *Approximation of waves in composite media*, The Mathematics of Finite Elements and Applications VI, MAFELAP 1987 (John R. Whiteman, ed.), Academic Press, London, 1987, pp. 55–74.

Nonrefereed Conference Proceedings and Other

[8] E. M. Fernández-Berdaguer and J. E. Santos, *Parameter estimation in viscoelastic media*, Proceedings del Congress "Italian-Latinamerican Conference on Applied and Industrial Mathematicsl (ITLA'97)", Rome, Italy, January 27-31, 1997, 97–100.

[7] J. E. Santos and P. M. Gauzellino, *Parallel algorithms for the numerical simulation of waves*, Proceedings del Congress "Italian-Latinamerican Conference on Applied and Industrial Mathematicsl (ITLA'97)", Rome, Italy, January 27-31, 1997, 219–222.

[6] J. E. Santos and D. Sheen, *On the solution of magnetotellurics*, Proceedings of the 16th Wokshop on Pure Mathematics, Nonlinear Partial Differential Equations and Their Applications, Pure Mathematics Research Association of the Korean Academic Council, Chooncheon, Korea, July 12–16, 1996, pp. 155–166.

[5] J. E. Santos, *Procesamiento en paralelo. Teoría y algunas aplicaciones en geofísica*, Proceedings of the Primer Coloquio Latinoamericano de Matemática Aplicada a la Industria, Centro Latinoamericano de Matemática e Informática, Facultad de Ingeniería, Universidad Nacional de Buenos Aires, Argentina 1996, pp. 55–79..

[4] D. Sheen, J. E. Santos, and J. Douglas, Jr., *Frequency domain parallel algorithms for the simulation of elastic and acoustic waves*, Numerical Analysis — Finite Element Methods (Ha-Jine Kimn, ed.),

Proceedings of the Applied Mathematics Workshop, Ajou University, Korea, Feb. 16-18, 1993, vol. 1, KAIST, Taejon, Korea, pp. 243–288.

[3] J. L. Hensley, J. Douglas, Jr., and J. E. Santos, *Dispersion of type II Biot waves in inhomogeneous media*, Proceedings of the 6th International Conference on Mathematical Methods in Engineering, Plzeň, May 27–31, 1991, vol. 1, pp. 67–83.

[2] J. Douglas, Jr., J. E. Santos, and J. L. Hensley, *Simulation of Biot waves in a cylindrically symmetric domain*, Third International Conference on Hyperbolic Problems; Theory, Numerical Methods and Applications (Björn Engquist and Bertil Gustafsson, eds.), Studentlitteratur, Chartwell-Bratt,, Uppsala, 1991, pp. 330–350.

[1] J. E. Santos, *Efficient time stepping methods for the simulation of wave propagation in three-dimensional elastic media*, Cuadernos de Matemática y Mecánica, N. 8, 1984, PEMA-INTEC, CONICET, Guemes 3450, 3000 Santa Fé.

Other works

[2] J. E. Santos, *Waves in Dispersive Media*, Technical Report #322, October 1998, Center for Applied Mathematics, Purdue University, Lecture Notes of a graduate course (MA692b), Purdue University, spring semester 1995 (86 pages).

[1] J. E. Santos, *Introduction to the Theory of Poroelasticity*, Technical Report #321, October 1998, Center for Applied Mathematics, Purdue University, Lecture Notes of a graduate course (MA692c), Purdue University, spring semester 1994 (100 pages).

Invited talks 2025

Rock Physics simulations using core data to estimate the stiffness tensor in Vaca Muerta organic-rich mudrock, Celebrate the Legacy of Sven Treitel, SEG-NGRI Symposium 2025, Hyderabad, India, June 19-20 2025.

Invited talks 2022

Numerical simulation of waves in non-isothermal poroelastic media, Rock Physics and Geofluid Detection Workshop, Hohai University, Nanjing, China, November 13, 2022.

Invited talks 2021

Wave induced fluid flow in gas-hydrate bearing sediments, Hohai University, Nanjing, China, December 20, 2021.

Invited talks 2020

Attenuation and dispersion of seismic waves in thin layered porous rocks saturated by two-phase fluids Society of Exploration Geophysics (SEG) Rock Physics Workshop, Hohai, China, December 18-20, 2020.

Invited Talks 2019

Invited Keynote Speaker: Seismic response of fractures and induced anisotropy in poroelastic media, Society of Exploration Geophysics (SEG) Rock Physics Workshop, Quindao, China, October 25-27, 2019.

Numerical Simulation of CO_2 Storage and Seismic Monitoring in Saline Aquifers, Beiging Chinese Geophysical Union Conference, Beiging, China, October 29, 2019.

Wuhan Applied Acoustic Conference, Numerical simulation of CO_2 sequestration, Wuhan, China, November 1rst, 2019.

Numerical Simulation in Applied Geophysics. From the Mesoscale to the Macroscale, Department of Geology, Northwest University, Xian, China, May 10th 2019,

Numerical Upscaling in Applied Geophysics. The Mesoscale, School of Earth Sciences and Engineering, Hohai University, Nanjing, China, May 15th, 2019.

Invited Talks 2018

A Finite Element Upscaling Procedure to Characterize Hydrocarbon Reservoir Formations, Rock Physics and Geofluid Detection Research Workshop, Hohai University, Nanjing, China, November 2-4, 2018,

Numerical Simulation in Applied Geophysics. From the Mesoscale to the Macroscale, 9th China National Symposium on Reservoir Acoustics and Drilling Exploration Technology Frontiers, Beijing, China, November 6th, 2018.

Invited Talks 2017

A Numerical Rocks Physics Approach to Model Wave Propagation in Hydrocarbon Reservoirs. III Workshop en Modelado, Migración e Inversión Sísmica, Universidad de Santander, Bucaramanga, Colombia. Junio 20-23, 2017.

Invited Talks 2016

Fracture Induced Anisotropy in Poroelastic Media A Finite Element Approach, Purdue University, Department of Mathematics, Bridge to Research, February 2, 2016.

Invited Talks 2015

Fractures and Induced Anisotropy in Poroelastic Media. From de Mesoscale to the Macroscale, IV International Conference on Applied Mathematics, Design and Control, Mathematical Methods and Modeling in Engineering and Life Sciences, November 4-6, 2015, Universidad Nacional de San Martín, Buenos Aires, Argentina.

Invited Talks 2014

Seismic response of fractures and induced anisotropy in poroelastic media, Department of Mathematics and Statistics, University of Calgary, Canada, October 2014.

Wave Propagation in Fractured Poroelastic Media, WCCM-ECCM-ECFD 2014 Congress, Minysimposium Advanced Computational Techniques in Geophysical Sciences I, July 23, 2014, Barcelona, Spain.

Numerical modeling of fluid flow and time-lapse seismics to monitor CO_2 sequestration in aquifiers, Instituto de Matemática Aplicada del Litoral (IMAL), May 30th, 2014, Santa Fe, Argentina,

Numerical Simulation of Fluid Flow and Time-Lapse Seismics Applied to CO_2 Sequestration at the Sleipner-field, GEOTECHNICAL WORKSHOP ON ENERGY GEOTECHNICS, PURDUE GEOTECHNICAL SOCIETY, April 26, 2014, Purdue Memorial Union.

Invited Talks 2013

Acoustics in porous media, Institute of Acoustics Orso Mario Corbino, Rome, Italy, July 19, 2013.

Invited Talks 2012

Harmonic experiments to model fracture induced anisotropy, KAUST-IAMCS WORKSHOP on Modeling and Simulation of Wave Propagation and Applications, Thuwal, Kindom of Saudi Arabia, May 8-9, 2012.

Invited Talks 2011

Numerical upscaling procedures in fluid-saturated poroelastic media Institute for Scientific Computation, Texas A& M University, September 2011.

Invited Talks 2008

Waves in Fluid Saturated Porous Media, Theory and Applications, Department of Civil Engineering, Purdue University, February 2008.

Waves in Porous Media and Applications, Conference of the Annual Meeting of the AR-SIAM, Santa Fé, Argentina, October 30th, 2008.

Invited Talks 2006

Wave propagation in Fluid Saturated Porous Media, Instituto de Matematica Aplicada del Litoral, Universidad Nacional del Litoral- CONICET, November 2006.

Invited Talks 2005

Hydraulic Conductivity Estimation in Partially Saturated Soils using the Adjoint Method, Congreso sobre Métodos Numéricos para Ecuaciones Diferenciales, Facultad de Ciencias Exactas y Naturales, Universidad Nacional de Buenos Aires, November 2005.

Invited Talks 2004

Approximation of Waves in Fluid–Saturated Porous Media. The Case of Composite Solid Frames, Institute for Scientific Computation, Texas A&M University, 3404 TAMU, College Station, Texas, USA, april 2004.

Invited Talks 2003

Numerical Simulation of Ultrasonic Waves in Reservoir Rocks with Patchy Saturation and Fractal Petrophysical Properties, Congreso INMAT 203, Facultad de Ingeniería, Universidad Nacional de Buenos Aires, december 15–18, 2003.

Invited Talks 2001

Numerical Simulation of Groundwater Flow in Variably Saturated Heterogeneous Soils, Instituto de Cálculo, Facultad de Ciencias Exactas y Naturales, Universidad Nacional de Buenos Aires, October 2001.

Invited Talks 1999

Nonconforming Methods for Maxwell Equations with Application to Magnetotellurics, Conference on the Mathematics of Finite Elements and Applications (MAFELAP99), Minisymposium on the Time Harmonic Maxwell Equations, Brunel University, London, june 24, 1999.

Invited Talks 1998

Nonconforming Mixed Finite Element Methods for Maxwell Equations, Laboratorio de Computaçao Científica del CNPq, Rua Getulio Vargas 333, Quitandinha, 25651-070, Petrópolis, RJ, Brasil, june 24, 1998.

Invited Talks 1997

Parallel algorithms for the numerical simulation of waves, Italian-Latinamerican Conference on Applied and Industrial Mathematics (ITLA '97), Rome, Italy, January 28, 1997.

Invited Talks 1996

Modelado numérico en geofísica aplicada, Escuela de Matemática Aplicada a la Industria, Facultad de Ingeniería, Universidad de Mar del Plata, August 9, 1996.
Numerical simulation of waves in dispersive media, School on Numerical Simulation of PDEs: Methods, Algorithms, Application, International Center for Theoretical Physics, Trieste, Italy, September 23, 1996.

Invited Talks 1995

Parallel algorithms for the simulation of waves; implementation in the Paragon XP/S Parallel Supercomputer, Noveno Encuentro Nacional de Investigadores y Usuarios del Método de Elementos Finitos en la Argentina (ENIEF 95, Bariloche, Rio Negro), November 10, 1995.
Parallel scientific computing applied to numerical modelling in geophysics, Primer Coloquio Latinoamericano de Matemática Aplicada a la Industria y la Medicina, Facultad de Ingeniería, Universidad Nacional de Buenos Aires, December 1, 1995.

Invited Talks 1994

Space-frequency domain approximation of waves in attenuating media, MECOM '94, November 8, 1994, Mar del Plata, Argentina.
A domain decomposition procedure for the numerical simulation of waves in dispersive media, 18th Conference of the Asociación Argentina de Geodesia y Geofisica, October 1994, La Plata, Argentina.

Invited Talks 1993

Numerical simulation of waves in fluid-saturated porous media, Institute for Advanced Study, Princeton, New Jersey, March 8, 1993.
Parameter estimation from seismic data using optimization techniques, Departamento de Geofísica Aplicada, Universidad Nacional de La Plata, June 28, 1993.

Invited Talks 1991

Analysis of the high frequency Biot equations, Purdue University, Center for Applied Mathematics, February 26, 1991.
Scattering of waves in Biot media, Asociación Argentina de Mecánica Computacional, Paraná, September 24, 1991.
Approximate solution of the equation of motion for nearly elastic solids, Argentine Nuclear Society, Buenos Aires, November 12, 1991.

Invited Talks 1990

Wave propagation in Biot media (part 1), Purdue University, Center for Applied Mathematics, November 27, 1990.
Wave propagation in Biot media (part 2), Purdue University, Center for Applied Mathematics, November 29, 1990.

Invited Talks 1989

Waves in porous media, Purdue University, Center for Applied Mathematics, March 2, 1989.

Wave propagation in two-phase fluid saturated porous media, Purdue University, Center for Applied Mathematics, September 5, 1989.
Wave propagation in fluid-saturated porous media, Argonne National Laboratory, Argonne, Illinois 60439, September 20, 1989.

Invited Talks 1988

A model for wave propagation in two-phase fluid-saturated porous media, Purdue University, Center for Applied Mathematics, March 22, 1988.
Generacion de microsismogramas Sintéticos por el Método de Elementos Finitos, Workshop Aplicacoes da Ciencia na Engenharia de Reservatorios de Petroleo, Rio de Janeiro, Brasil, August 19, 1988.

Invited Talks 1987

Elastic waves in composite media, Institute for Mathematics and Its Applications, University of Minnesota, May 14, 1987.

Invited Talks 1985

Finite element methods for the simulation of elastic wave propagation in fluid-saturated porous media, SEG-SIAM-SPE Conference on Mathematical and Computational Methods in Seismic Exploration and Reservoir Modelling, Houston, Texas, January 21-24, 1985.
Numerical methods for the approximate solution of Biot's low-frequency dynamic equations, Department of Mathematics, University of Chicago, February 12, 1985.
Elastic wave propagation in fluid-saturated porous media, Amoco Production Company, Research Center, Tulsa, Oklahoma, March 1, 1985.
Numerical methods for a composite model in elastodynamics, VI Congreso Latinoamericano sobre Métodos Computacionales para Ingeniería y I Congreso Argentino de Mecańica Computacional, Paraná, Argentina, October 15-18, 1985.

Invited Talks 1984

Numerical simulation of miscible displacement in porous media, PEMA-INTEC, CONICET, Guemes 3450, 3000 Santa Fe, Argentina, March 13-14, 1984.
Simulation of wave propagation in non-homogeneous elastic media, 2o Encuentro Nacional de Investigadores y Usuarios del Método de Elementos Finitos (ENIEF 84) Bariloche, Argentina, July 3, 1984.
Wave propagation in fluid-saturated porous media, Laboratorio de Computacao Cientifíca (LCC,CNPq) Rio de Janeiro, Brazil, August 17, 1984.

Funded Research Projects

13. Project Title: *Caracterización Estática y Dinámica de Reservorios no Convencionales Utilizando Simulación Numérica (Static and Dynamic Characterization of Unconventional Reservoirs using Numerical Simulation, Research Project Number PICT-2015-1909, Funded by the ANPCyT of Argentina, The National Agency for the Promotion of Science and Technology.*
Amount: U$S 40,000.
Period: 1/1/2017–31/12/2019.

12. Project Title: *Simulación Numérica en Medios Porosos Saturados, PIP 112-2011010-0777 (Numerical simulation in fluid-saturated porous media, Research Project Number 112-2011010-0777).*

Funding Institution: Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Argentina.
Amount: $ 272.000
Period: 1/1/2014–31/12/2016.

11. Project Title: *CAPP - ONDAS (Seismic response of fractured reservoirs) Project Funded by the ANPCyT of Argentina (National Agency for the Promotion of of Science and Technology).*
This was a project based on the association of the National Petroleum Company of Argentina (YPF) and Universidad Nacional de La Plata to perform research on topics of interest for the company YPF. As part of this project, ANPCyT awarded one PhD scholarship and three graduate scholarships in the area of Geophysics.
I was the PhD advisor for the student Robiel Martínez Corredor, awarded the PhD scholarship in Universidad Nacional de La Plata, Argentina.
ANPCyT also funded travel expenses for the participant researchers and for short-term visiting consultors.
Amount: $ 28.858.970,00
Period: 1/4/2012–1/4/2014.

10. Project Title: *Métodos Numéricos para la Resolución de Problemas en en Geofísica Aplicada, PIP 112-200801-00952 (Numerical Methods for Problems Arising in Applied Geophysics, Research Project Number 112-200801-00952).*

Funding Institution: Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Argentina.
Amount: U$S 73,500.
Period: 1/1/2009–31/12/2011.

9. Project Title: *Métodos Numéricos en Geofísica Aplicada. (Numerical Methods in Applied Geophysics).*

Funding Institution: Universidad Nacional de La Plata.
Amount: U$S 6,000.
Period: 1/01/2008–31/12/2011.

8. Project Title: *CO2 Geological Storage. Research into Monitoring and Verification Technology (CO2 ReMoVe). Project Number 518350.*

Funding Institution: European Union, Sixth Framework Programme, Sustainable Energy Systems.
Amount: EU 90,000
Period: 1/01/2009–31/12/2012.

7. Project Title: *Modelado Numérico de Propección Electrosísmica Utilizando el Método de Elementos Finitos(Numerical Modeling of Electroseismic Propecting Using the Finite Element Method).*

Funding Institution: Repsol YPF S.A., CTA.
Amount: U$S 70,000.
Period: 1/4/2007–31/12/2007.

6. Project Title: *Simulación Numérica en Geofísica Aplicada. PIP 5126/05 (Numerical Simulation in Applied Geophysics, Research Project Number 5126/05).*

Funding Institution: Consejo Nacional de Investigaciones Cientí ficas y Técnicas (CONICET), Argentina.
Amount: U$S 31,500.
Period: 1/09/2005–30/09/2007.

5. Project Title: *Simulación Numérica en Exploración Geofísica (Numerical Simulation in Exploration Geophysics).*

Funding Institution: Universidad Nacional de La Plata.
Amount: U$S 6,000.
Period: 1/01/2004–31/12/2006.

4. Project Title: *Modelado Numérico para Aplicaciones Geofísicas PICT 2003, 03-13376. (Numerical Modeling for Geophysical Applications, Project Number 03-13376.*

Funding Institution: Agencia Nacional de Promoción Científica y Tecnológica (ANPCyT). Approved by Directory of ANPCyT with approval form Number 331/04.
Amount: U$S 57,000.
Period: 1/01/2004–31/12/2006.

3. Project Title: *Proyecto para el Modelado Directo e Inverso en Geofísica Aplicada (PROMODIGA) (Forward and Inverse Modeling in Applied Geophysics).*
Supporting Institution: Consejo Nacional de Investigaciones Cientí ficas y Técnicas (CONICET), proyecto de investigación plurianual (PIP) Number 0363/98, Nro. de Resolución: D 1854/98.
Period: 9/1998–9/2001.
Amount: U$S 21,267.

2. Project Title: *Resolución Numérica de Problemas Directos e Inversos en Geofísica Aplicada (Numerical Solution of Direct and Inverse Problems in Applied Geophysics).*

Funding Institution: Universidad Nacional de La Plata.
Amount: U$S 5,100.
Period: 1/01/2001–31/12/2003.

1. Project Title: *Detection of Over–pressure Zones from Seismic and Well Data.*
Funding Institution: Observatorio Geofísico Sperimentale, Trieste, Italia, approved by the European Union. Contract Number JOF3-CT97-0036, European Union, Joule Project (DG12).
Amount: U$S 27,547.77
Period: 12/1997–12/2000.

PhD Students.

1. Claudia L. Ravazzoli.
PhD thesis title: Modeling of wave propagation phenomena in dispersive media.
University: Universidad Nacional de La Plata.
year: 1995

2. Patricia M. Gauzellino.
PhD thesis title: Numerical simulation of wave propagation phenomena in dispersive media.
University: Universidad Nacional de La Plata.
year: 1999.

3. Fabio Iván Zyserman.
PhD thesis title: Numerical modeling of electromagnetic waves with application to magnetotellurics.
University: Universidad Nacional de La Plata.
year: 2000.

4. Luis Guarracino.
PhD thesis title: Mixed methods for the numerical simulation of saturated–unsaturated flow and contaminant transport in heterogeneous porous media.
University: Universidad Nacional de La Plata.
year: 2001.

5. Germán Rubino.
PhD thesis title: Attenuation and dispersion of seismic waves in highly heterogeneous fluid-saturated porous media.
University: Universidad Nacional de La Plata.
year: 2008.

6. Robiel Martínez Corredor.
PhD thesis topic: Seismic characterization of fracture-induced velocity and Q-anisotropy in fractured porous media.
University: Universidad Nacional de La Plata.
year: 2017

7. Lucas A. Macias
PhD thesis topic: Numerical simulation of fluid flow and wave propagation in unconventional hydrocarbon reservoirs
University: Universidad de Buenos Aires.
year: in progress

Current Research Interests:

Finite-element based harmonic experiments to determine equivalent viscoelastic transversely isotropic (VTI) media long-wave equivalent to a either viscoelastic or poroviscoelastic media containing dense sets of oriented fractures.

Theoretical and numerical finite-element based analysis of velocity and Q-anisotropy in finely layered and fractured poroviscoelastic media.

Numerical modeling of fluid flow and time-lapse seismics applied to CO_2 storage and monitoring.

Finite element approximation of coupled seismic and electromagnetic waves in fluid-saturated porous media.

Seismic monitoring of hydrocarbon unconventional reservoirs.

Analysis of existence and uniqueness of solutions of the equations of thermoporoelasticity and their finite element approximations.