

# Axel Osses

PhD Applied Mathematics

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## Summary: Inverse Problems and Mathematical Modeling

My research line is inverse problems and mathematical modeling involving differential equations. The most important consequence of my work is that I had been able to motivate other young researchers to do original research using mathematical modeling. I have explored new fields of applications in Chile for these fundamental science and I am convinced that the fundamental transfer science-technology is possible by generating interdisciplinary work between high level and active groups in engineering, medicine, geophysics and astronomy in particular for inverse problems linked to tomography, microscopy, elastography, data assimilation and interferometry. I have done quality teaching, with enthusiasm and dedication to the students. I have also taken administrative responsibilities as Teaching Coordinator, Director, Faculty Council and member of several academic and postgraduate committees in our department and other research centers. I have established fruitful relationships with research groups in Chile (PUC, UTFSM, USACH, Electrical, Mechanical Engineering, Astronomy, Geophysics, Medicine in Chile) and abroad (Francia: U. Paris 6, Paris 5, Paris-Sud, ENPC, Mines Paris-Tech, E. Central de Lyon, U. Versailles, U. Toulouse, U. Caen, España: U. Sevilla, USA: UW, U. Chicago) through theoretical and applied research projects.

## Degrees

- 1995–1998 **Ph.D., Applied Mathematics**, Ecole Polytechnique, Paris.  
Research Area: Control and Inverse Problems in Partial Differential Equations. Thesis: *Quelques méthodes théoriques et numériques de contrôlabilité et problèmes d'interactions fluide-structure*.
- 1994–1995 **D.E.A. Analyse Numérique, Calcul Scientifique et Analyse non Linéaire**, U. Pierre et Marie Curie-Paris VI and Ecole Polytechnique, Paris.  
Mention: Très bien (17.53/20). Stage: *Implémentation d'une méthode numérique pour un problème de contrôlabilité approchée sur une courbe intérieure*, Ecole Polytechnique, Centre de Mathématiques Appliquées CMAP.
- 1994 **Ingeniero Civil Matemático**, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile, Santiago, Chile.  
Thesis: *Análisis matemático y numérico de varios modelos espectrales de vibración sólida inducida por un fluido*, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile.
- 1991 **Licenciatura en Ciencias de la Ingeniería, Mención Ingeniería Matemática**, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile, Santiago, Chile.

## Academic Positions

- 2021–2022 **Presidente Comisión de Evaluación Académica Local de Facultad**, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile.

- 2018-2021 **Miembro Comisión de Evaluación de Facultad**, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile.
- 2020-2022 **Miembro Comité de Doctorado**, DIM, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile.
- 2014-2021 **Academic Committee Member**, Centro de Modelamiento Matemático, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile.
- 2016-2018 **Consejero de Facultad**, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile.
- 2014-2016 **Director**, Departamento de Ingeniería Matemática, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile.
- since July **Full time Professor**, Departamento de Ingeniería Matemática, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile.
- 2013 **Visiting Professor** Institut Henri-Poincaré and Laboratoire Jacques-Louis-Lions, U. de Paris 6 (June). Invited by J.-M. Coron.
- since March **Associated Editor**, Mathematical Control and Related Fields MCRF, American Institute of Mathematical Sciences ([aimsciences.org/journals/index.jsp](http://aimsciences.org/journals/index.jsp)).
- 2013-2014 **CNA postgraduate peer reviewer**, Comisión Nacional de Acreditación, Chile.
- since July **Sub-Director, Teaching Coordinator, Academic Committee member**, Departamento de Ingeniería Matemática, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile.
- 2012
- 2011 **Visiting Professor** Rensselaer Polytechnic Institute, Troy, NY, USA (April-June). Invited by J. McLaughlin.
- 2011 **Visiting Professor** Département de Mathématiques, U. de Toulouse (June-July).
- 2006 **Visiting Professor** University of Washington, Seattle, USA (April). Invited by G. Uhlmann.
- 2005 **CNRS Associated Researcher** Laboratoire Jacques Louis-Lions, U. Paris VI (May-July).

## Awards and fellowships

- 2013 **Best Pregraduate Teacher** distinction decerned to the four best graduate teachers of the year, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile.
- 1998 **Alpha Fellowship**, Lambda Project of the European Union.
- 1994-97 **President of the Republic Grant**, International Cooperation Agency (A.G.C.I.), MIDEPLAN, Government of Chile.
- 1993 **Research Grant**, Department of Mathematical Engineering, U. de Chile, decerned to best pregraduate students.
- 1986 **Merit Grant**, Escuela de Ingeniería, U. de Chile, free scholarship first year.
- 1985 **Price Angel Faivovich and best graduate student** decerned to the best graduate student, Liceo José Miguel Carrera –Instituto Nacional.

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## Scientific databases

- WoS ID: <https://publons.com/researcher/N-8835-2019/>  
Publons: <https://publons.com/researcher/3265908/axel-osses>  
ORCID ID: <http://orcid.org/0000-0001-6833-4064>  
Scopus ID: <https://www.scopus.com/authid/detail.uri?authorId=6603282773>  
Scholar: <https://scholar.google.com/citations?user=ihVS4FAAAAAAJ>  
Academic: <http://www.uchile.cl/portafolio-academico/perfilAcademico.jsf?username=axosses>  
Faculty: [http://ingenieria.uchile.cl/facultad/cuerpo-academico/92409/ingenieria-matematica?qui\\_id=5541](http://ingenieria.uchile.cl/facultad/cuerpo-academico/92409/ingenieria-matematica?qui_id=5541)

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## Articles in preparation

The symbol \* indicates joint publication developed with MSc or PhD students

- E. Bonnetier, M. Courdurier, A. Osses, F. Triki. *Thin 2D waveguide detection and radiating resonances for the Helmholtz equation.*
- M. de Buhan, S. Ervedoza, A. Osses. *Recovery of the bottom profile in a 1-D tank containing a fluid modeled by the Saint-Venant equations.*
- L. Baudouin, A. Mercado, A. Osses. *Inverse problem in transmission of waves with a variable jump at a non convex interface.*
- F. Salas\*, A. Osses, P. Torres, M. Rosales. *Modeling and control of the waves in a copper converter by bubble jet output in the surface.*

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## Preprints

The symbol \* indicates joint publication developed with MSc or PhD students

- N. Cosentino, F. Lambert, N. Opazo, A. Osses, E. van't Wout. *ClimAG-Krigger: A New (Paleo)Climatology-Oriented Toolbox for Anisotropic Global Kriging Interpolation.*
- J. Aguayo\*, C. Bertoglio, A. Osses. *Parameter identification for the Navier-Stokes equations with applications to obstacles detection.*
- E. Chacra\*, C. Espinoza, S. González, J.-G. Minonzio, A. Osses. *Non-periodic wooden mechanical metamaterials.*
- E. Cruz, L. Fierro\*, A. Osses, D. Hasson, A. Lara. *A mathematical model of landscape optimization for joint production of wood and water as an ecosystem service.* Submitted.
- A. De Cezaro, E. Hafemann, A. Leitao, A. Osses. *A regularization method based on level-sets for the problem of crack detection from electrical measurements.* In revision.

## Published or accepted articles

The symbol \* indicates joint publication developed with MsC or PhD students

- 2022 L. Leal\*, P. Montealegre, A. Osses, I. Rapaport. *A Large Diffusion and Small Amplification Dynamics for Density Classification on Graphs*. Int. J. of Modern Physics C. DOI:10.1142/S0129183123500560
- 2022 J. Aguayo, C. Bertoglio, A. Osses *Un problema inverso de mecánica de fluidos aplicado en la detección de anomalías en válvulas cardíacas*. Revista SOCHID (2022) Vol. 37, No. 2. Número especial 200 años de la Ecuación de Navier-Stokes.
- 2022 J. Aguayo\*, A. Osses *A stability result for the identification of a permeability parameter on Navier-Stokes equations* Inverse Problems 38(7), 2022. DOI: 10.1088/1361-6420/ac6971
- 2022 H. Herthum, H. Carrillo, A. Osses, S. Uribe, I. Sack, C. Bertoglio. *Optimal multiple motion encoding (OMME) in Phase-Contrast MRI*. Medical Image Analysis, 78, 102416, 2022 DOI: 10.1016/j.media.2022.102416
- 2022 R. Aróstica\*, J.-G. Minonzio, A. Osses. *A simplified homogenization model applied to viscoelastic behavior of cortical bone at ultrasonic frequencies*. Journal of Biomechanics 131, 2022. 10.1016/j.jbiomech.2021.110868
- 2021 E. Contreras-Reyes, D. Díaz, J.P. Bello-González, K. Slezak, B. Potin, D. Comte, A. Maksymowicz, J. A. Ruiz, A. Osses, S. Ruiz, *Subduction zone fluids and arc magmas conducted by lithospheric deformed regions beneath the central Andes* Nature Portfolio Scientific Reports 11, 23078, DOI: 10.1138/s41598-021-02430-9
- 2021 P. Arratia\*, M. Courdurier, E. Cueva, A. Osses, B. Palacios. *Lipschitz stability for backward heat equation with application to fluorescence microscopy*. SIAM J. Math. Anal. 53–2, 5948–5978, 2021. ArXiv-link, DOI: 10.1137/20M1374183
- 2021 D. Nolte, J. Urbina, J. Sotelo, L. Sok, C. Montalba, I. Valverde, A. Osses, S. Uribe, C. Bertoglio. *Validation of 4D Flow based relative pressure maps in aortic flows* Medical Image Analysis 74, 102195, 2021. DOI: 10.1016/j.media.2021.102195
- 2021 L. Baudouin, M. de Buhan, S. Ervedoza, A. Osses. *Carleman-based reconstruction algorithm for the waves*. SIAM J. Num. Anal. 59(2), 998–1039, 2021. DOI: 10.1137/20M1315798
- 2021 J. Aguayo\*, A. Osses, C. Bertoglio. *A distributed resistance inverse method for flow obstacle identification from internal velocity measurements*. Inverse Problems 37(2), 2021. DOI: 10.1088/1361-6420/abcd8
- 2021 L. Cabrera\*, S. Ruiz, P. Poli, E. Contreras-Reyes, A. Osses and R. Mancini. *Northern Chile Intermediate-Depth Earthquakes Controlled by Plate Hydration*. Geophysical Journal International 226(1), 78–90, 2021. DOI: 10.1093/gji/ggaa565
- 2020 E. Cueva\*, M. Courdurier, A. Osses, V. Castañeda, B. Palacios, S. Härtel. *Mathematical Modeling for the 2D Light-Sheet Fluorescence Microscopy image reconstruction*. Inverse Problems, 36(7), 2020. DOI: 10.1088/1361-6420/ab80d8
- 2019 H. Carrillo\*, A. Osses, S. Uribe, C. Bertoglio. *Optimal Dual-VENC (ODV) Unwrapping in Phase-Contrast MRI*. IEEE Transactions on Medical Imaging, 38(5) 1263–1270, 2019. DOI: 10.1109/TMI.2018.2882553

- 2019 S. Casassus, S. Pérez, A. Osses, S. Marino. *Cooling in the shade of warped transition disks*. Monthly Notices of the Royal Astronomical Society: Letters 486(1), L58–L62, 2019. DOI: 10.1093/mnrasl/slz059
- 2018 S. Casassus, H. Avenhaus, S. Pérez, V. Navarro, M. Cárcamo, S. Marino, L. Cieza, S.P. Quanz, F. Alarcón, A. Zurlo, A. Osses, F.R. Rannou, P.E. Román, M. Barraza. *An inner warp in the DoAr 44 T Tauri transition disc*. Monthly Notices of the Royal Astronomical Society 477(4) 5104–5114, 2018. DOI: 10.1093/mnras/sty894
- 2018 E. Cueva\*, A. Osses, J.-C. Quintana, C. Tejos, M. Courdurier and P. Irarrázaval *Algebraic reconstruction of source and attenuation in SPECT using first scattering measurements*. In New Trends in Parameter Identification for Mathematical Models, Birkhäuser, Trends in Mathematics, B. Hofmann, A. Leitao, J.P. Zubelli. (Eds.), 345 pages, Springer International Publishing, Cham, Switzerland, pp. 53-66, 2018. DOI: 10.1007/978-3-319-70824-9\_3
- 2018 N. Carreno, R. Morales\*, A. Osses. *Potential reconstruction for a class of hyperbolic systems from incomplete measurements*. Inverse Problems, 34(8), 2018. DOI: 10.1088/1361-6420/aac6a9
- 2017 L. Cieza, S. Casassus, S. Pérez, A. Hales, M. Cárcamo, M. Ansdell, H. Avenhaus, A. Bayo, G. Bertrang, H. Canovas, V. Christiaens, W. Dent, G. Ferrero, R. Gamen, J. Olofsson, S. Orcajo, A. Osses, K. Pena-Ramirez, D. Principe, D. Ruiz-Rodríguez, M. Schreiber, G. van der Plas, J. Williams, A. Zurlo. *ALMA Observations of Elias 2-24: A Protoplanetary Disk with Multiple Gaps in the Ophiuchus Molecular Cloud*. Astrophysical Journal Letters 851(2), 2018. DOI: 10.3847/2041-8213/aa9b7b
- 2017 C. Bertoglio, R. Núñez\*, F. Galarce, D. Nordsletten, A. Osses. *Relative pressure estimation from velocity measurements in blood flows: state-of-the-art and new approaches*. International Journal for Numerical Methods in Biomedical Engineering, 34(2), 2017. DOI: 10.1002/cnm.2925
- 2017 G. García, C. Montoya\*, A. Osses. *A source reconstruction algorithm for the Stokes system from incomplete velocity measurements*. Inverse Problems 33(10), 2017. DOI: 10.1088/1361-6420/aa863f
- 2016 P. Moisset de Espanés, A. Osses and I. Rapaport. *Fixed-points in Random Boolean Networks: The impact of parallelism in the Barabási-Albert scale-free topology case*. Biosystems, 150, 167–176, 2016.
- 2015 A. Henríquez\*, A. Osses, L. Gallardo and M. Diaz Resquin. *Analysis and optimal design of air quality monitoring networks using a variational approach*. Tellus B, 67, 1–13, 2015. DOI: 10.3402/tellusb.v67.25385
- 2015 M. Courdurier, F. Monard, A. Osses and F. Romero\*. *Simultaneous source and attenuation reconstruction in SPECT using ballistic and single scattering data*. Inverse Problems 31(9), 1–30, 2015. DOI: 10.1088/0266-5611/31/9/095002
- 2015 L. Baudouin, S. Ervedoza, A. Osses. *Stability of an inverse problem for the discrete wave equation and convergence results*. J. Math. Pures Appl. 103, 1475–1522, 2015.

- 2014 P. Manríquez\*, E. Contreras, A. Osses. *Lithospheric 3D flexure modelling of the oceanic plate seaward of the trench using variable elastic thickness*. Geophys. J. Int. 196, 681–693, 2014. DOI: 10.1093/gji/ggt464
- 2013 R. Briceno\*, P. Moisset, A. Osses, I. Rapaport. *Solving the density classification problem with a large diffusion and small amplification cellular automaton*. Physica D 261, 70–80, 2013.
- 2013 G. Garcia, A. Osses, M. Tapia\*. *A heat source reconstruction formula from single internal measurements using a family of null controls*. Journal of Inverse and Ill-posed Problems, Vol. 21(6), 755–779, 2013. DOI: 10.1515/jip-2011-0001
- 2013 A. Osses, T. Faúndez\*, L. Gallardo *Analysis and evolution of air quality monitoring networks using combined statistical information indexes*. Tellus B, 65, 2013.
- 2013 B. Palacios\*, A. Osses, *Potential recovery for Reissner–Mindlin and Kirchhoff–Love plate models using global Carleman estimates*. Inverse Problems 29(7), 75009–34, 2013.
- 2011 P. Saide, G. Carmichael, S. N. Spak, L. Gallardo, A. Osses, M. Mena-Carrasco, M. Pagowski, *Forecasting urban PM10 and PM2.5 pollution episodes in very stable nocturnal conditions and complex terrain using WRF-Chem CO tracer model*, Atmospheric Environment, 45, 2769–2780, 2011.
- 2011 P. Saide\*, M. Bocquet, A. Osses, L. Gallardo, *Constraining surface emissions of air pollutants using inverse modeling: method intercomparison and a new two-step multiscale approach*. Tellus B, 63, 360–370, 2011.
- 2011 G. Garcia, A. Osses, J.-P. Puel, *A Null Controllability data assimilation methodology applied to a large scale ocean circulation model*. M2AN 45(2), 361–386, 2011.
- 2010 M. de Buhan\*, A. Osses, *Logarithmic stability in determination of a 3D viscoelastic coefficient and a numerical example*. Inverse Problems 26(9), 095006, 2010.
- 2010 J. Contreras-Reyes, A. Osses, *Lithospheric flexure modeling seaward of the Chile trench: Implications for oceanic plate weakening in the Trench Outer Rise region*. Geophysical Journal International 182(1), 97–112, 2010. DOI: 10.1111/j.1365-246X.2010.04629.x
- 2010 P. Cornilleau\*, J.-P. Lohéac, A. Osses, *Nonlinear Neumann boundary stabilization of the wave equation using rotated multipliers*, Journal on Dynamical and Control Systems, 16(2) 163–188, 2010.
- 2009 M. de Buhan\*, A. Osses, *A stability result for the recovery of a 3D viscoelasticity system coefficient*. C. R. Acad. Sci. Paris, Ser. I 347 (2009) 1373–1378.
- 2009 M. Boulakia, C. Grandmont, A. Osses, *Some inverse stability results for the bistable reaction-diffusion equation using Carleman inequalities*, C. R. Math. Acad. Sci. Paris. Ser. I 347 (2009) 619–622.
- 2009 J.-P. Puel, A. Osses, *Unique continuation property near a corner and its fluid structure controllability consequences*, ESAIM-COCV 15, 279–294, 2009.
- 2009 Z. Gerdtzen, C. Salgado, A. Osses, I. Rapaport, B. Andrews, J. Asenjo, *Modeling heterocyst pattern formation in cyanobacteria*. BMC Bioinformatics, 10(S16), 2009.

- 2009 P. Saide\*, A. Osses, L. Gallardo, M. Osses, *Adjoint inverse modeling of a CO emission inventory at the city scale: Santiago de Chile's case*, Atmos. Chem. Phys. Discuss., 9, 6325–6361, 2009.
- 2008 E. Godoy\*, A. Osses, J. Ortega, A. Valencia, *Modeling and control of surface gravity waves in a model of a copper converter*. Applied Mathematical Modelling, 32(9), 1696–1710, 2008.
- 2008 A. Mercado\*, A. Osses, L. Rosier, *Inverse problems for the Schrödinger equation via Carleman inequalities with degenerate weights*, Inverse Problems, 24(1), 015017, 2008.
- 2008 A. Mercado\*, A. Osses, L. Rosier, *Carleman inequalities and inverse problems for the Schrödinger equation*. C. R. Acad. Sci. Paris, Ser. I, 346, 53–58, 2008.
- 2008 A. Osses, M. Boulakia\*, *Local null controllability of a two-dimensional fluid-structure interaction problem*. ESAIM-COCV, 14 (1), 1–42, 2008.
- 2008 L. Baffico, C. Grandmont, Y. Maday, A. Osses, *Homogenization of an elastic media with gaseous bubbles*, SIAM Multiscale Modeling & Simulation 7(1), 432–465, 2008.
- 2007 L. Baudouin, A. Mercado\*, A. Osses, *A global Carleman estimates in a transmission wave equation and application to a one-measurement inverse problem*, Inverse Problems, 23, 1–22, 2007.
- 2007 S. Guerrero, A. Mercado\*, A. Osses, *An inverse inequality for some transport-diffusion equation. Application to the regional approximate controllability*. Asymptotic Analysis, 52(3,4) 243–257, 2007.
- 2006 A. Osses, M. Boulakia\*, *Two-dimensional local null controllability of a rigid structure in a Navier-Stokes fluid*. C. R. Math. Acad. Sci. Paris., Ser. I, 343(2), 105–109, 2006.
- 2006 A. Doubova, A. Osses, *Rotated weights in global Carleman estimates applied to an inverse problem for the wave equation*. Inverse Problems, 22, 265–296, 2006.
- 2005 A. Doubova, A. Osses, *Application of global Carleman estimates with rotated weights to an inverse problem for the wave equation*, C. R. Math. Acad. Sci. Paris. 341(9), 555–560, 2005.
- 2005 E. Fernandez-Cara, G. Garcia\*, A. Osses, *Controls insensitizing the observation of a quasi-geostrophic ocean model*, SIAM J. Control Optim., 43(5), 1616–1639, 2005.
- 2003 E. Fernandez-Cara, G. Garcia\*, A. Osses, *Insensitizing Controls for a Large-Scale Ocean Circulation Model*, C. R. Math. Acad. Sci. Paris, 337(4), 265–270, 2003.
- 2003 A. Osses, J. Saint Jean Paulin, C. Conca, *Approximate controllability and homogenization of a semilinear elliptic problem*. J. Math. Anal. Appl. 285(1), 17–36, 2003.
- 2002 A. Doubova, A. Osses, J.-P. Puel, *Exact controllability to trajectories for semilinear heat equations with discontinuous diffusion coefficients*, Volume dedicated to J.-L. Lions, ESAIM:COCV, vol. 8, pp. 621-661, 2002.
- 2001 A. Osses, *A rotated multiplier applied to the controllability of waves, elasticity, and tangential Stokes control*, SIAM J. Control Optim., 40(3), 777–800, 2001.

- 1999 A. Osses, J.-P. Puel, *Approximate controllability of a linear model in solid-fluid interaction*, ESAIM: Control, Optimization and Calculus of Variations, vol 4, 497–513, 1999.
- 1998 A. Osses, J.-P. Puel, *On the controllability of the Laplace equation observed on an interior curve*, Revista Matemática de la Universidad Complutense de Madrid 11(2), 403–441, 1998.
- 1998 A. Osses, *Une nouvelle famille de multiplicateurs et applications à la contrôlabilité exacte de l'équation d'ondes* C. R. Acad. Sci. Paris, t. 326, Sér. I, 1099-1104, 1998.
- 1998 A. Osses, J.-P. Puel, *Boundary controllability of a stationary Stokes system with linear convection observed on an interior curve*. Journal on Optimization Theory and its Applications 99(1), 201–234, 1998.
- 1998 C. Conca, A. Osses, J. Planchard, *Asymptotic analysis relating three spectral models in fluid-solid vibrations*, SIAM Journal on Numerical Analysis 35(3), 1020–1048, 1998.
- 1997 C. Conca, A. Osses, J. Planchard, *Added mass and damping in fluid-structure interaction*. Computer Methods in Applied Mechanics and Engineering 146, 384-405, 1997.

## Books or book chapters

- 2020 Huneus, N., Urquiza A., Gayó, E., Osses, M., Arriagada, R., Valdés, M., Álamos, N., Amigo, C., Arrieta, D., Basoa, K., Billi, M., Blanco, G., Boisier, J.P., Calvo, R., Casielles, I., Castro, M., Chahuán, J., Christie, D., Cordero, L., Correa, V., Cortés, J., Fleming, Z., Gajardo, N., Gallardo, L., Gómez, L., Insunza, X., Iriarte, P., Labraña, J., Lambert, F., Muñoz, A., Opazo, M., O’Ryan, R., Osses, A., Plass, M., Rivas, M., Salinas, S., Santander, S., Seguel, R., Smith, P., Tolvett. *El aire que respiramos: pasado, presente y futuro. Cap 6 Impactos del cambio climático y de políticas de mitigación en la calidad del aire durante las próximas décadas* Centro de Ciencia del Clima y la Resiliencia, 102 pp. [https://www.cr2.cl/wp-content/uploads/2020/09/Informe\\_Contaminacion\\_Espanol\\_2020.pdf](https://www.cr2.cl/wp-content/uploads/2020/09/Informe_Contaminacion_Espanol_2020.pdf)
- 2012 Zhu, T., Melamed, M. L., Parrish, D., Gauss, M., Klenner, L. G., Lawrence, M., Konare, A., Liousse, C. (2012). *WMO/IGAC Impacts of Megacities on Air Pollution and Climate*, GAW Report No. 205, Geneva : World Meteorological Organization, 309 p. Participation in Chapter 4, South America.
- 2011 A. Osses, *Análisis Numérico*, Vol 6, Herramientas para la formación de profesores de matemáticas. ISBN: 9789563060720, FONDEF D05I-10211, Editorial J. C. Sáez, edition 2000 copies, 168 pgs., Santiago de Chile, 2011.

## Proceedings (indexed)

- 2022 F. Salas\*, P. Torres, A. Osses. *Surface wave mitigation in a copper converter via H-infinity mixed sensitivity control*. 19th Symposium on Control, Optimization and Automation in Mining, Mineral and Metal Processing, Montreal, Canada, Aug. 15th–17th, 2022. DOI:10.1016/j.ifacol.2022.09.260



- 2021 C. Araya, A. Martínez, D. Ramiandrisoa, D. Ta, K. Xu, A. Osses, and J-G. Minonzio. Real Time Waveguide Parameter Estimation Using Sparse Multimode Disperse Radon Transform. 2021 IEEE UFFC Latin America Ultrasonics Symposium (LAUS), 2021, pp. 1-4, DOI: 10.1109/LAUS53676.2021.9639171
- 2017 L. Araya-Hernández, A. Osses, J. Silva, F. Tobar. *A Bayesian Mixture-of-Gaussians Model for Astronomical Observations in Interferometry*. In IEEE CHILECON 2017, October 18-20, 2017, Pucón, Chile. DOI: 10.1109/CHILECON.2017.8229662
- 2006 A. Osses *Four variations in global Carleman weights applied to inverse and controllability problems*, Proceedings of the Seminar of Inverse Problems and Applications, in honor of the 1980 seminar of Alberto Calderón, LNCC, Río de Janeiro, Brazil. Computational and Applied Mathematics, 25, (2-3), 1–19, 2006. DOI: 10.1590/S0101-82052006000200004
- 2006 A. Osses, O. Titaud *Finite Rank Approximation based method for solving the RTE in stellar atmospheres and application to an inverse problem* in Radiative Transfer and Applications to Very Large Telescopes Ph. Stee (ed) EAS Publications Series, 18 77–97, 2006. DOI: 10.1051/eas:2006006
- 2001 C. Conca, A. Osses, J. Saint Jean Paulin, *A semilinear control problem involving homogenization*. Proceedings of the USA-Chile Workshop on Nonlinear Analysis (Viña del Mar-Valparaíso, 2000), Electron. J. Diff. Eqns., 6, Southwest Texas State Univ., San Marcos, TX, 109–122, 2001.
- 1999 A. Osses, J.-P. Puel, *Approximate controllability for a hydro-elastic model in a rectangular domain*. Optimal Control of partial differential equations (Chemnitz, 1998), Internat. Ser. Numer. Math., 133, 231–243, Birkhäuser, Basel, 1999.
- 1997 A. Osses, J.-P. Puel, *Some extensions of approximate controllability results to inverse problems*. Élasticité, viscoélasticité et contrôle optimal (Lyon 1995), ESAIM Proc., 2, 133–143, Soc. Math. Appl. Indust., Paris, 1997.

## Actual Research Projects

- 2022-2026 **Basal FB210005**, *Center for Mathematical Modeling CMM*, Associated Member.
- 2018–2022 **Fondap 15110009**, *Center for Climate Change and Resilience CR2*, Miembro Asistente, (Director L. Gallardo, Geophysics Dept. U. Chile).
- 2021-2023 **Climat-Amsud CYAN 21-CLIMAT-05**, *Climate Dynamics Analysis from Data*, Director in Chile, (Directora D. Sciamarella, CNRS-Conicet-UBA).
- 2020-2023 **Milenium Nucleus**, *Núcleo Milenio NCN19-161 en Problemas de Control e Inversos Aplicados*, Miembro asociado, (Director E. Cerpa, PUC).
- 2020-2022 **Math-Amsud Project ACIPDE MATH190008**, *Brazil - Chile - France*, Analysis, Control and Inverse problems for Partial Differential Equations, Member. Director in Chile: Nicolás Carreño.
- 2020-2024 **Fondecyt Regular 1201311**, *Cortical bone assessment using ultrasonic guided waves: Towards a robust clinical measurement*, Co-PI, (Director J.-G. Minonzio, CNRS-UV).

2019-2022 **Fondecyt Regular 1191903**, *Mathematical Inverse Problems in Photon Transport, Elasticity Imaging and Wave Propagation, Applications to Biomedical Images and Earth Sciences*, Director, Co-PI Matías Courdurier (PUC).

## Finished Research Projects

- 2021 **Puente Basal ACE210010**, *Center for Mathematical Modeling CMM*, Associated Member.
- 2017-2021 **Basal AFB170001**, *Center for Mathematical Modeling CMM*, Associated Member.
- 2017-2021 **Milenium Nucleus**, *Núcleo Milenio NCN17-129 en Resonancia Magnética Cardiovascular*, Miembro adjunto, (Director S. Uribe, CIB-PUC).
- 2018-2021 **Fondecyt Regular 3180363**, *Control of high-order partial differential equations*, Co-investigador, Director Patricio Guzmán(UTFSM).
- 2018-2020 **Math-Amsud Math-Geo 18-MATH-04**, *Mathematical methods for Geophysical flows*, Director in Chile, (Director D. Sciamarella, CNRS-Conicet-UBA).
- 2013-2017 **Fondap 15110009**, *Center for Climate Change and Resilience CR2*, Miembro Asociado, (Director L. Gallardo, Geophysics Dept. U. Chile).
- 2015-2018 **Fondecyt-CONICYT 1151512**, *Inverse Problems in Physical Sciences and Engineering*, Personal Project. Director.
- 2016-2017 **Ecos C14U01**, *Estimating black carbon emissions by assimilating aerosol absorption optical depth*, Member, (Director N. Hunneus, Geophysics Dept. U. Chile).
- 2015-2016 **Math-Amsud SOCDE 15MATH-02**, *Sparse Optimal Control of Differential Equations: Algorithms and Applications*, Associated Member, (Director P. Gajardo UTFSM).
- 2014-2015 **Math-Amsud COSIP 14MATH-03**, *Control Systems and Identification Problems*, Associated Member. (Director E. Cerpa UTFSM).
- 2013-2015 **Anillo-ACPA**, *Analysis of Control Problems and Applications*, Associated Member. (Director E. Hernández UTFSM).
- 2011 - 2014 **FONDECYT-CONICYT 1110290**, *Inverse Problems in Partial Differential Equations with Applications*, Personal Project. Director.
- 2009 - 2011 **CONICYT-CNRS-CMM-MathAmsud**, *Controllability and inverse problems in PDE's (CIP-PDE)*, Director. Director in France: Jean-Michel Coron, Paris 6.
- 2007-2011 **ICDB**, *Instituto de Dinámica Celular y Biotecnología*, Member of the Mathematical Modeling group.
- 2005-2009 **FONDAP-CONICYT 15000001**, *Center for Mathematical Modeling CMM*, Renovation. Associate Member.
- 2007-2009 **FONDEF D05LI0211**, *Herramientas para la Formación de Profesores de Matemáticas*, Member.
- 2006 - 2010 **SAEMC-IAI**, *South American Emissions, Megacities and Climate: Bogotá, Buenos Aires, Rio de Janeiro, Santiago, Sao Paulo*, IAI Inter American Institute for Global Change. Responsable: Laura Gallardo. Member (co-PI).

- 2006 – 2009 **FONDECYT-CONICYT 1061263**, *Global Carleman Inequalities in Controllability and Inverse Problems*, Personal Project. Director.
- 2005 – 2007 **ECOS-CONICYT CO4E08**, *Controllability and Inverse Problems*, French-Chilean Cooperation Project. French Director: O. Kavian (U. Versailles). Chilean director.
- 2007 – 2009 **CONICYT-INRIA-STIC-Amsud**, *Air quality prediction with data assimilation (Argentina-Chile-France)*, General Director.
- 2003 – 2005 **FONDECYT-CONICYT 1030808-7030059-7040165**, *Controlability of PDE's, Unique Continuation, Carleman Inequalities and Applications*, Personal Project and International Cooperation grants. Director.
- 2000 – 2005 **FONDAP-CONICYT 15000001**, *Center of Mathematical Modeling*, Member.
- 2003 – 2006 **CNRS-ACI**, *Modélisation mathématique et numérique du système respiratoire*, French Responsable: Marc Briane. Chilean team member.
- 2004 **UMESAM-IAI**, *Urban Mobile Emissions in South America Mega Cities: Bogotá, Buenos Aires, Lima, Rio de Janeiro, Santiago, Sao Paulo*, IAI InterAmerican Institute for Global Change. Responsable: Laura Gallardo. Member (co-PI).
- 2002 – 2004 **ECOS-CONICYT CO1E02**, *Partial Differential Equations in Mechanics and Physics. Modeling, Control and Scientific Computation*, French-Chilean Cooperation Project. Chilean director, J.-P. Puel French director.
- 2001 – 2003 **FONDEF D00I 1068**, *Interface dynamic models in fusion, conversion and refinement in Teniente Copper Converter*, Applied Mathematics Project. Member.
- 2000 – 2002 **FONDECYT-CONICYT 1000955-7000955**, *Theoretical and Numerical Study of Controllability in Fluid-Structure Interaction Systems*, Personal Project and International Cooperation grants. Director.
- 1994 – 1997 **FONDECYT-CONICYT 1940494**, *Methods and applications of homogenization theory*, Colaborator.

## PhD Students

- 2020–2022 **Jorge Aguayo**, *Inverse problems for recovering heart valves shapes from velocity measurements*, Doctorado en Ciencias de la Ingeniería con Mención en Modelación Matemática, U. de Chile, Director in co-direction with C. Bertoglio UChile-U. Gröningen.  
Graduated in August 2022. ANID granted.
- 2018– **Rodrigo Quezada**, *Image registration using Radon transform and finite elements.*, Doctorado en Ciencias de la Ingeniería con Mención en Modelación Matemática, U. de Chile, Co-directed with D. Hurtado (PUC).  
In progress. ANID granted
- 2016–2020 **Hugo Carrillo**, *Inverse problems in elastography and displacement-flow MRI*, Doctorado en Ciencias de la Ingeniería con Mención en Modelación Matemática, U. de Chile. Now in a postdoc position in INRIA-Chile., Director in co-direction with C. Bertoglio UChile-U. Gröningen.  
Graduated in January 2020. Conicyt granted. Prix Best PhD Thesis 2020. U. Gröningen

- 2015–2019 **Evelyn Cueva**, *Mathematical modeling and inverse problems in biomedical imaging*, Doctorado en Ciencias de la Ingeniería con Mención en Modelación Matemática, U. de Chile, Director in co-direction with M. Courdurier.  
Graduated in October 2019. Conicyt granted. Now researcher in Escuela Politécnica Nacional, Quito, Ecuador.
- 2016–2019 **David Nolte**, *Hemodynamic analysis based on biofluid models and MRI velocity measurements*, Doctorado en Ciencias de la Ingeniería con Mención en Fluidodinámica, U. de Chile, Director in co-direction with C. Bertoglio UChile-U. Gröningen.  
Graduated in September 2019. Conicyt granted. Now in a postdoc position in UTBerlin.
- 2016– **Félix Carrasco**, *co-direction with J. Ruiz*, Doctorado en Ciencias Atmosféricas, UBA, co-Director.  
UBA-Conicet granted
- 2014–2019 **Roberto Morales Ponce**, *Contribution to inverse problems and controllability issues of hyperbolic and parabolic partial differential equations*, Doctorado en Ciencias de la Ingeniería con Mención en Modelación Matemática, U. de Chile, Director in co-direction with N. Carreno.  
Graduated in July 2019. Conicyt granted. Now in a postdoc position in UTFSM.
- 2013–2016 **Cristhián Montoya**, *Inverse problems for the Stokes system with missing components*, Doctorado en Ciencias de la Ingeniería con Mención en Modelación Matemática, U. de Chile, Director.  
Graduated July 2019. Conicyt granted. Now in a postdoc position in UTFSM.
- 2007–2010 **Maya de Buhán**, *Brain biomechanics. Inverse and control problems*, Doctorado en Ciencias de la Ingeniería con Mención en Modelación Matemática, U. de Chile and U. Paris 6, Director. Co-direction with Pascal Frey.  
Financed with CONICYT/CNRS grants. Now in a CNRS position in France, U. Paris V and U. Orsay.
- 2005–2007 **Alberto Mercado**, *Algunos problemas inversos y de controlabilidad: transmisión de ondas y transporte-difusión (Quelques problèmes inverses et de contrôlabilité: transmissions des ondes et transport-diffusion)*, Doctorado en Ciencias de la Ingeniería con Mención en Modelación Matemática, U. de Chile and U. de Versailles, Director. Co-direction with Jean-Pierre Puel.  
Financed with MECESUP/CMM grants and ECOS-CONICYT now in a permanent position at USM, Valparaíso, Chile
- 2001–2004 **Galina García**, *Control y adaptividad en modelos de circulación oceánica (Adaptivity and control in oceanographic models)*, Ph. D. Thesis in Applied Mathematics, U. de Concepción, Concepción, Chile, Director. Co-direction with Rodolfo Rodríguez. Supported by FONDAP-CONICYT grants now in a permanent position at USACH University, Santiago

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## Thesis in interdisciplinary programs (MsC, Engineering)

- 2021–2022 **Santiago Parraguez**, *Mechanical Engineering Thesis and MsC in Mechanical Engineering*, Improving OMI-NO<sub>2</sub> spatial resolution using a stochastic convolutional neural network over central and southern Chile, Co-directed with Viviana Meruane, Mechanical Engineering Department U. Chile and Laura Gallardo, Geophysics Department, U. Chile.

- 2017–2019 **Roberto Rojas**, *Electrical Engineering Thesis and MsC in Electrical Engineering*, Compressed sensing in interferometry, Co-Directed with J. Silva, Electrical Engineering Department, U. de Chile. Graduated in December 2019.
- 2015–2017 **Jeremías Garay Labra**, *MsC in Geophysics*, Modeling of contact problems for tectonic plates. Modelo flexural de la placa subductante, Co-Directed with E. Contreras-Reyes from Geophysics Department, U. de Chile.  
Conicyt granted. Now working at National Seismological Center CSN, U. de Chile
- 2014–2015 **Francisco Esteban Reyes Aspé**, *Electrical Engineering Thesis and MsC in Electrical Engineering*, Simulation tool development for semiconductor devices based on drift-diffusion and Monte Carlo, Co-Directed with M. Díaz from Electrical Engineering Department.
- 2011–2012 **Paula Manríquez**, *MsC in Geophysics*, Modelamiento tridimensional de placas litosféricas y aplicaciones a la identificación de su espesor, Co-directed with E. Contreras, Geophysics Department, U. de Chile.  
Now working at National Seismological Center CSN, U. de Chile
- 2010–2011 **Carlos Castillo**, *Mining Civil Engineering Thesis and MsC. Geophysical Sciences*, Percepción remota y uso de modelación inversa para la estimación de emisiones de megafuentes de azufre oxidado en la zona central de Chile, Co-directed with L. Gallardo, Geophysics Department, U. Chile.  
Working at a public institution
- 2010 **Daniel Lillo**, *Biotechnology Engineering Thesis, U. de Chile*, Investigación, modelación y reconstrucción de redes de regulación transcripcionales utilizando un enfoque de problemas inversos, Co-directed with J. Asenjo, BioEngineering Department, U. de Chile.  
Working in enterprise
- 2004 **Eduardo Contreras-Reyes**, *Métodos matemáticos para la inversión del tiempo de viaje a partir de mediciones sísmicas en el Moho de Juan Fernández (Mathematical methods for travel time inversion from seismic measurements in the Juan Fernández Moho)*, Research CMM Student, Research director of him during and after his MsC Thesis in Seismology, Geophysics Department, U. de Chile.  
PhD in Seismology in Germany. Now in a permanent position at the Geophysics Department, U. de Chile

## Mathematical Engineering Thesis and MsC

- 2022-2023 **Fabián Sepúlveda**, *Mathematical Engineering Thesis and MsC in Engineering Sciences with mention in Mathematical Modeling*, Director in col. with Carlos Román (PUC).
- 2021-2022 **Emir Chacra**, *Mathematical Engineering Thesis and MsC in Engineering Sciences with mention in Mathematical Modeling*, Modelling the spectral manipulation of musical instrument with metamaterials, Director. In col. with Jean-Gabriel Minonzio (UV) y Carolina Espinoza (UChile).  
Graduated May 2022. Now Research Assitant at CMM.

- 2020-2022 **Felipe Olivares**, *Mathematical Engineering Thesis and MsC in Engineering Sciences with mention in Mathematical Modeling*, Identification of non stationary boundary deformation in arteries using shape derivatives and Navier-Stokes flows, Director. In col. with J. Mura (UTFSM). Graduated December 2022.
- 2020-2022 **Tabita Catalán**, *Mathematical Engineering Thesis and MsC in Engineering Sciences with mention in Mathematical Modeling*, Desarrollo de un modelo epidemiológico lagrangeano multiclase de tiempos de residencia y riesgos en ambientes aplicado al brote de covid19 en region metropolitana en Chile, Development of a multi-class Lagrangian epidemiological model of residence times and risks in environments applied to the outbreak of covid19 in the metropolitan region of Chile, Director. Graduated March 2022.
- 2019-2021 **Manuel Suil**, *Mathematical Engineering Thesis and MsC in Engineering Sciences with mention in Mathematical Modeling*, Analysis of tuning and machine learning methods applied to the equivalence and reduction of cardiac electrophysiology models., Director. In col. with D. Hurtado and F. Sahli (PUC). Graduated January 2021.
- 2019-2020 **Pablo Arratia**, *Mathematical Engineering Thesis and MsC in Engineering Sciences with mention in Mathematical Modeling*, Stability and reconstruction of an inverse problem in light-sheet microscopy., Director. In col. with M. Courdurier (PUC). Graduated August 2020.
- 2018-2019 **Reidmen Aróstica**, *Mathematical Engineering Thesis and MsC in Engineering Sciences with mention in Mathematical Modeling*, Numerical studies of a homogenized bone model and applications to porosity identification by ultrasound, Director. In col. with CMM (J.-G. Minonzio). Graduated April 2019
- 2017- **Francisco Fernández Coleman**, *Mathematical Engineering Thesis and MsC in Engineering Sciences with mention in Mathematical Modeling*, Análisis comparado de métodos SVD para un problema de recuperación de porosidad y espesor de hueso humano por sonido, Director. In col. with CMM (J.-G. Minonzio) In progress
- 2017- **Daniela Ponce**, *Mathematical Engineering Thesis, USACH*, Model sensitivity in inverse source seismic recovery from GPS measurements in the north of Chile, Director. in col. with G. García (USACH) and F. Ortega (DGF U. de Chile). In progress
- 2016- **Laura Fierro**, *Mathematical Engineering Thesis, U. de Concepción*, A mathematical model for forestry management with water consumption, Director. in col. with A. Lara (UAustral). In progress
- 2016–2017 **Felipe Salas Bravo**, *Mathematical Engineering Thesis and MsC in Engineering Sciences with mention in Mathematical Modeling*, Robust control in copper injection refinement, Director. CODELCO disruptive thesis award. Finished
- 2015-2016 **Rodolfo Andrés Núñez Uribe**, *Mathematical Engineering Thesis and MsC in Mathematical Modeling*, Estimation of relative pressure from velocity measurements in blood flows: state-of-the-art and new approaches, Co-Directed with C. Bertoglio from CMM, U. de Chile. Finished.

- 2015–2016 **Nicolás Molina Gaggero**, *Mathematical Engineering Thesis and MsC in Engineering Sciences with mention in Mathematical Modeling*, Control of a shallow water tank, Co-directed with E. Cerpa from UTFSM, Santiago, CMM granted.  
Doing PhD U. Paris 9 Dauphine. Finished.
- 2014 **Francisco Romero**, *Mathematical Engineering Thesis, U. de Chile*, An energy level SPECT method using attenuated Radon transform, Co-Director with M. Courdurier, PUC, Santiago.  
Doing PhD in Applied Mathematics, LHZ, Swizerland
- 2013–2014 **Adolfo Henríquez**, *Mathematical Engineering Thesis and MsC. Atmospheric Sciences*, Herramientas matemáticas para el análisis de sistemas de observación atmosférica, Co-directed with L. Gallardo, Geophysics Department, U. Chile.  
Finished.
- 2012 **Benjamín Palacios**, *Mathematical Engineering Thesis, U. de Chile*, Estudio de problemas inversos en ecuaciones hiperbólicas provenientes del análisis en flexura litosférica, Director.  
PhD in Applied Mathematics, UW, Seattle. Now academic position at Facultad de Matemáticas, PUC
- 2011–2012 **Félix Carrasco**, *Mathematical Engineering Thesis and MsC. Atmospheric Sciences*, Caracterización y optimización de la señal de carga de dióxido de azufre para Chile a través de modelación numérica de la dispersión y la transferencia radiativa, Co-directed with L. Gallardo, Geophysics Department, U. Chile.  
Doing a PhD in Atmospheric Sciences, UBA, Argentina
- 2011 **Anne Vesin**, *Mathematical Engineering Thesis, U. de Chile*, Asimilación de datos con el EnKF en un modelo hidrodinámico de la zona sur de Chile, Director.  
Working in a prospection private enterprise
- 2010 **Tania Faúndez**, *Mathematical Engineering Thesis, USACH*, Construcción optimal de redes de monitoreo aplicado a la vigilancia de contaminantes atmosféricos, Co-director with L. Gallardo, Geophysics Department, U. Chile.  
Working in enterprise
- 2009 **Nicolás Carreño**, *Mathematical Engineering Thesis, U. de Chile*, Identificación del coeficiente principal en una ecuación del calor no lineal usando desigualdades de Carleman, Director.  
PhD Paris VI, France. Now in a permanent position at USM, Santiago
- 2009 **Marcelo Tapia**, *Mathematical Engineering Thesis, U. de Chile*, Algunos problemas inversos de localización de fuentes en ecuaciones de difusión-transporte, Director.
- 2005 **Karina Malla**, *Kalman Filter strategies for data assimilation and application to source estimation*, Mathematical Engineering Thesis, U. de Concepción, Co-direction with J. Ortega, DIM.
- 2004 **Eduardo Cerpa**, *Un modelo de interacción fluido-estructura y resolución de un problema inverso (A fluid-structure interaction model and resolution of an inverse problem)*, Mathematical Engineering Thesis, U. de Chile, Co-directed C. Conca.  
PhD Paris 6, France. Now in a permanent position at USM, Santiago

- 2005 **Claudio Pizarro**, *Control asintótico de estructuras reforzadas (Asymptotic control of reinforced structures)*, Mathematical Engineering Thesis, U. de Chile, Directed in coll. with M. Vanninathan, TATA Institute, India.  
PhD Economics, Toulouse, France. Now in a position at Universidad de Los Andes
- 2004 **Eduardo Godoy**, *Estudio teórico y numérico del oleaje producido en Modelos del Convertidor Teniente debido a la inyección de aire por toberas (Theoretical and numerical study of waves produced in Teniente copper converter after air injection)*, Mathematical Engineering Thesis and MsC in Mechanical Engineering, Co-directed with A. Valencia, Mechanical Department, U. de Chile.  
Working in enterprise

## Scientific Dissemination

- 2020 *Participation in Covid2019 research, reports and their dissemination.* <http://covid-19.cmm.uchile.cl>
- 2019 *Taller: asimilación de datos y cambio climático.* Iniciativa Beauchef Cambio Climático. Semana de la Ingeniería y Ciencias en el Cambio Climático, Santiago, FCFM, 19–23 ago 2019.
- 2015 *Bellos Conceptos, un paseo poético por las matemáticas.* Production of a video for general public about five beautiful concepts in mathematics with Cristián Warnken. [www.dim.uchile.cl/videos/118736/video-bellos-conceptos-un-paseo-poetico-por-las-matematicas](http://www.dim.uchile.cl/videos/118736/video-bellos-conceptos-un-paseo-poetico-por-las-matematicas)
- 2015 *50 años Construyendo la Ingeniería Matemática en Chile*, Editor, Ediciones DIM, edition 750 copies, 168 pgs., Santiago de Chile, 2015. [www.dim.uchile.cl/departamento/118468/libro-50-anos](http://www.dim.uchile.cl/departamento/118468/libro-50-anos)
- 2015 *Time Line of 50 years of the Department of Mathematical Engineering.* [www.dim.uchile.cl/departamento/111876/cronologia](http://www.dim.uchile.cl/departamento/111876/cronologia)
- 2015 *Anatomía del casi gol de Pinilla*, reportaje de la revista del Sábado, El Mercurio. Sábado 6 de junio 2015 [https://www.cmm.uchile.cl/wp-content/uploads/2015/06/20150606\\_El\\_Mercurio\\_Revista\\_SABADOop.pdf](https://www.cmm.uchile.cl/wp-content/uploads/2015/06/20150606_El_Mercurio_Revista_SABADOop.pdf)

## Courses Taught

- Engineering, Escuela de Ingeniería, FCFM, U. de Chile.
  - Algebra (MA1101)
  - Calculus (MA1201). Global Coordinator 2002-2004
  - Calculus in Several Variables (MA2201)
  - Ordinary Differential Equations (MA2601)
- Mathematical Engineering, Departamento de Ingeniería Matemática, FCFM. U. de Chile
  - Numerical Analysis in Partial Differential Equations
  - Optimal Control
  - Complex Analysis
- MsC Informática Médica, Facultad de Medicina. U. de Chile
  - Colaboración en el curso: Procesamiento de imágenes y bioseñales. Image processing and biosignals. 2019-2022.
- Ph.D. Mathematical Modeling, Departamento de Ingeniería Matemática, FCFM, U. de Chile



- Control and Inverse Problems in PDE
- Evolution and Partial Differential Equations
- Numerical Methods in Engineering Sciences
- Variational Inverse Problems in Geophysics
- o Thematic Schools
  - Mathematics I, Scholarship Summer School, FCFM U. de Chile, Jan 2000–2007.
  - Numerical Analysis, MECESUP PhD Summer School, FCFM U. de Chile, Dec 2002. Organizer.
  - Inverse Problems, DIM/CMM Doctoral School, FCFM U. de Chile, Sep-Oct 2006. Organizer.

## Organization of International Congresses

IPMAS2022 **Inverse Problems, Methods, Applications and Synergies**, *January 12th-14th, 2022, CMM-PUC, Santiago, Chile*, Organizer, <http://eventos.cmm.uchile.cl/ipmas2022>.

The objective is to put together the state of the art of different methodologies of inverse problems with real applications in Astronomy, Medicine and Neuroscience, and promote the synergies to share scientific and algorithmic methods in inverse problems.

Datacardio2020 **Data based modeling in the cardiovascular system**, *January 15th-16th, 2020, CMM-PUC, Santiago, Chile*, Organizer, <http://eventos.cmm.uchile.cl/datacardio2020>.

El objetivo del encuentro es incentivar el intercambio de nuevas técnicas de modelamiento directo e inverso del sistema cardiovascular basadas en datos, técnicas también útiles en otros ámbitos del modelamiento en biomecánica.

IPMAS2019 **Inverse Problems, Methods, Applications and Synergies**, *January 15th-18th, 2019, CMM-PUC, Santiago, Chile*, Organizer, <http://eventos.cmm.uchile.cl/ipmas2019>.

The objective of the workshop is to put together the state of the art of different methodologies of inverse problems with real applications in Astronomy, Medicine, Geophysics and Mining and promote the synergies to share scientific and algorithmic methods in inverse problems.

MM2018 **Multiscale Modeling and Methods: Application in Engineering, Biology and Medicine**, *January 8th-12th, 2018, CMM, Santiago, Chile*, Organizer, <http://eventos.cmm.uchile.cl/multiscale2018>.

The methods combine microscopic and macroscopic descriptions of the phenomena. The application of these methods allows creating new more adequate and more precise models in biology and medicine. Organized with G. Panasenko and D. Hurtado.

IP-Phys2015 **Inverse Problems in the Physical Sciences**, *August 3rd-5th, 2015, CMM, Santiago, Chile*, Organizer, [eventos.cmm.uchile.cl/ipphys2015](http://eventos.cmm.uchile.cl/ipphys2015).

This is a satellite conference of the "XVIII International Congress on Mathematical Physics" ICMP2015, to be held also in Santiago, from July 27th to August 1st, 2015 ([www.icmp2015.cl](http://www.icmp2015.cl)). The goal of this satellite conference is to take advantage of the ICMP2015 conference, to create new connections and to enrich the interactions among researchers in the mathematical inverse problems and the mathematical physics communities, including astronomy and medicine. Organized with G. Uhlmann and M. Courdurier.

- CPIP-2013 **Coupled Physics Inverse Problems International Workshop**, *January 5-8, 2013, CMM, Santiago, Chile*, Main organizer, [cpip2013.cmm.uchile.cl](http://cpip2013.cmm.uchile.cl).  
The focus of the conference was on "coupled-physics" or "hybrid" imaging modalities that have received a lot of attention in recent years due to the great promises they hold for medical imaging and other fields. By combining two or three different types of waves (or physical fields) these methods overcome limitations of classical tomography techniques and deliver otherwise unavailable, potentially life-saving diagnostic information. Besides medical imaging there has been also recent interest on coupled-physics inverse methods in oil exploration in particular on the seismo-electric effect.
- PASI-CIPPDE-2012 **Inverse Problems and PDE Control International Workshop and Summer School**, *January 16-23, 2012, Santiago, Chile*, Main organizer, [pasicippde.cmm.uchile.cl](http://pasicippde.cmm.uchile.cl).  
PASI-CIPPDE 2012 would bring together the expertise from participants of both of two recent thematic semesters (MSRI program: inverse problems and applications, August-December 2010 and Control of Partial Differential Equations and Applications Trimester, October-December 2010), fostering the interaction of these fields and the international cooperation between groups throughout the Americas (USA and Latin America) and Europe (France, Finland, Spain, Italy, etc.).
- OSSAF2012 **Towards an Integrated Observing System for South America: air quality assessment and forecasting in Mega cities**, *Santiago, FCFM, U. De Chile, Enero 9-12, 2012*, Miembro Comité Organizador y coordinador curso Optimal Network Design, [ossaf.cmm.uchile.cl](http://ossaf.cmm.uchile.cl).  
Actividad conjunta con el Departamento de Geofísica de la Universidad de Chile.
- AMS-SOMACHI **Inverse Problems**, *1st AMS-SOMACHI Congress, December 2010, Pucón, Chile*, Organizer of Thematic Minisimposium.
- CIMPA-2010 **CIMPA Research Summer School on Inverse Problems and Applications**, *Santiago, Chile. January 4-15, 2010*, Main organizer, [www.cimpa-icpam.org](http://www.cimpa-icpam.org).  
The objective of the CIMPA Summer School and Workshop is to review the state of art of Inverse Problems and to bring together research areas as control theory, inverse problems and optimal design. The workshop presentations and summer school courses will also involve applications in Medicine, Earth/Atmosphere Geophysics, Acoustic, Industrial Design
- WIPA-2010 **Workshop on Inverse Problems and Application**, *UTFSM, Valparaíso, Chile. January 18-22, 2010*, Main organizer, [archive.schools.cimpa.info/archivesecoles/20101130165933/openmenu\\_014.html](http://archive.schools.cimpa.info/archivesecoles/20101130165933/openmenu_014.html).
- SAEMC-2007 **Data assimilation theory and applications in chemical weather forecast**, *CMM, Santiago, Chile. June 5-7, 2007*, Local Organizing Committee, [dataassimilation07.cmm.uchile.cl](http://dataassimilation07.cmm.uchile.cl).
- ANCIF-2005 **International Workshop on Numerical Analysis and Control of Fluid-Structure Interactions**, *Chillán, Chile. December 5-10, 2005*, Local Organizing Committee, [ancif05.iecn.u-nancy.fr](http://ancif05.iecn.u-nancy.fr).
- UMESAM-2004 **Workshop de Modelamiento Inverso**, *Santiago, Chile, CMM, Marzo 29-31 2004*, Comité Organizador.

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## Conferences Attended

- Aug 2022 *Surface wave mitigation in a copper converter via H-infinity mixed sensitivity control.* 19th Symposium on Control, Optimization and Automation in Mining, Mineral and Metal Processing, Montreal, Canada, Aug. 15th–17th, 2022.
- May 2022 *A resistance method for a fluid- obstacle inverse problem.* 10th International Conference Inverse Problems: Modeling and Simulation. Malta, May 22th–28th, 2022.
- Nov 2021 *Some inverse problems in heart valve identification.* Workshop on Non-Linear Analysis and Control Theory in honor of Enrique Zuazua. Nov. 3th-5th, 2021.
- Oct 2021 *Localización de la pared arterial basada en mediciones de velocidad en un fluido incompresible.* Jornadas de Mecánica Computacional, Oct. 7th-8th, 2021
- Oct 2021 *Real time waveguide parameter estimation using sparse multimode disperse Radon Transform* with J.-G. Minonzio, Latin America Ultrasonics Symposium IEEE LAUS2021, Oct. 4th-5th, 2021
- Sep 2021 *Improving OMI-NO2 resolution based on deep learning over central and southern Chile.* With S. Parraguez, L. Gallardo, V. Meruane and M. Osses 16th IGAC Sep. 12th-29th, 2021
- Aug 2021 *Stability of a resistance inverse algorithm for recovering obstacles in fluids from local velocity measurements.* IFIP TC7 Conference on System Modelling and Optimization, Aug. 30th–Sept 3rd, 2021.
- April 2021 *Inverse problems in heart valve identification.* XXXIII Jornadas matemáticas de la Zona Sur. April 20th-24th, 2021.
- Jul 2019 *Mathematical modeling of light-sheet fluorescence microscopy.* AIP2019 Applied Inverse Problems Conference. Grenoble Jul 8–12 2019.
- May 2021 *Optimal multiple motion encoding in phase contrast MRI* Poster session en ISMRM & SMRT Annual Meeting & Exhibition, 15-20 May 2021 Digital web version
- May 2019 *Mathematical modeling of light-sheet fluorescence microscopy* HKUST-IAS2019 Inverse Problems, Imaging and PDE's Hong-Kong, May 20–24 2019.
- Jan 2019 *Mathematical modeling in Light Sheet Fluorescence Microscopy image reconstruction, Optimal Dual-VENC (ODV) Unwrapping in Phase-Contrast MRI, Numerical Validation of a Homogenized Bone Model* IPMAS2019, 3 Posters presentation, 15 al 17-ene-2019.
- Dec 2018 *Some Inverse problems in Biomedical imaging* ICOPS2018, Valparaiso, 04 al 07-dic-2018.
- Dec 2018 *Some Inverse problems in Biomedical imaging* LXXXVII Encuentro SOMACHI, Rancagua, 19 al 21-dic-2018.
- Nov 2018 *A mathematical model of landscape optimization for joint production of wood and water as an ecosystem service* Reunión Plenaria CR2, Termas de Jahuel, 19-21-nov-2018.
- Nov 2018 *Reaction-diffusion continuous/discrete models in biology and medicine and some related mathematical results* Taller DISC Universidad Adolfo Ibáñez, 06-nov-2018.

- Oct 2018 *Adquisición de Imágenes biológicas y biomédicas, un enfoque matemático parte II* Curso-seminario, Facultad de Medicina U. de Chile, 06-oct-18
- Oct 2018 *CMM Bio and Health ERCAM2018*, CMM, Santiago, 29-oct-2018.
- Sep 2018 *Mathematical Inverse problems and some applications in Geophysics, Biomedical imaging*, Astronomy Chile-Japan Forum, 25–28 September 2018, Nikko, Japan.
- Sep 2018 *Adquisición de Imágenes biológicas y biomédicas, un enfoque matemático parte I* Curso-seminario, Facultad de Medicina U. de Chile, 01-sep-18
- Jul 2018 *Inverse problems and data assimilation in Geophysical Sciences Workshop MathAM-SUD*, Buenos Aires, Argentina, 10 al 13-jul-18
- Oct 2017 *Some inverse problems in biomedical imaging*. New Trends in Parameter Identification for Mathematical Model, IMPA, Rio de Janeiro, October 30th to November 3rd 2017. Available online: [youtu.be/aH7og1B1GXU](https://youtu.be/aH7og1B1GXU)
- May 2016 *The making of a dissemination video about "Can one hear the shape of a drum?". Spectral Geometry and the Legacy of Mark Kac*, Facultad de Matemáticas, PUC, May 2016.
- May 2016 *A source reconstruction algorithm for the Stokes system from local and missing velocity measurements*. In *Inverse Problems in the Mathematical Sciences*, Fethiye, Turkey, 23-27 may 2016, <http://www.ipms-conference.org/ipms2016>
- Jun 2015 *Stability and Reconstruction Issues in Inverse Problems*, Institut Henri Poincaré–Paris. *A semidiscrete inverse problem for waves, Simultaneous source and attenuation reconstruction in SPECT using low energy scattering data*, June 29th– July 3rd, 2015. Invited speaker <http://www.ihp.fr/en/CEB/T2-2015/workshop3>
- Nov 2015 Participant in Workshop Big Data and Environment. Buenos Aires, 10-13 November 2015. Organized by IFAECI (Instituto Franco-Argentino sobre Estudios de Clima y sus Impactos). Invited speaker <http://www.cima.fcen.uba.ar/UMI/bde>
- Jan 2015 COSIP2015, Workshop on Control Systems and Identification Problems, *Simultaneous source and attenuation reconstruction in SPECT using extra single scattering data*, January 12-16, 2015. Valparaiso. Invited speaker.
- May 2014 CIRM Workshop: *Problèmes récentes dans l'analyse mathématique et numérique des problèmes inverses. Stability and convergence results for an inverse problem for the wave equation*. CIRM Marseille, France, 19–23 may 2014, Invited speaker
- Jun 2013 PRIMA Congress, Shanghai Jiao Tong University, Shanghai, China, June 24–28, 2013. Invited speaker
- Jul 2012 International Conference on Inverse Problems and PDE Control. Chengdu, China, Sichuan University, July 30, August 3, 2012. Invited speaker
- Jun 2011 ICIAM 2011, Vancouver, Canada, Invited Speaker
- Nov 2010 Semestre de Contrôle en EDP, Institut Henri Poincaré, Paris, France, Invited Speaker
- Jul 2009 *Stability in recovering nonlinear parameters for the bistable reaction-diffusion equation using Carleman inequalities*, Rim Mathematical Association Congress, PRIMA2009, July 6-10 2009, UNSW, Sydney, Australia. Invited Speaker

- May 2009 *Stability in recovering nonlinear parameters for the bistable reaction-diffusion equation using Carleman inequalities*, International Conference on Mathematical Control Theory in honor of Prof. David L. Russell, May 15-17, 2009, Beijing, China. Invited Speaker
- Sep 2008 *Asimilación de datos y aplicaciones a ciencias atmosféricas*. 1er Encuentro de Radio-Astronomía y Meteorología en Valparaíso, Sep 25th 2008, Invited talk, Valparaíso, Chile
- Aug 2008 Inverse Problems in PDE's. 3rd LNCC Meeting, invited talk, August 11-15 2008, Petrópolis, Brazil
- Jun 2008 *Variants of Carleman Inequalities applied to Inverse Problems. Nonlinear heat equation, Schrödinger equation, transmission problems*. Control of Physical Systems and PDEs, Invited Speaker, Institut Henri Poincaré, Paris, France
- Apr 2008 Second SAEMC Workshop, Ubatuba, Brazil
- Sep 2007 *Variants of global Carleman weights in one-measurement inverse problems and fluid-structure controllability problems*, CEDYA 2007, Sep 24-28 2007, Sevilla, España. Communication
- Jun 2007 Summer School on Inverse Problems in Radiative Transfer, University of Washington, June 18-22 2007, Seattle, Atmospheric Inverse Problems at CMM. Invited Speaker
- Jan 2007 *Some global Carleman weights for inverse and controllability problems*. Conference honoring Alberto Calderón. IMPA, Jan 15-19 2007, Río de Janeiro, Brazil. Invited speaker
- Aug 2006 *Tres problemas de identificación de parámetros en EDP's de la geofísica*, XVI Congreso COMCA 2006, August 2-5 2006, U. de La Serena, La Serena, Chile
- Mar 2006 *An inverse problem for the wave equation with one time-dependent partial boundary measurement*, Seminar of Inverse Problems and Applications, in honor of the 1980 seminar of Alberto Calderón, Mar 21-24 2006, LNCC, Río de Janeiro, Brazil. Invited speaker
- Dec 2005 *Local stability for the inverse problem of recovering coefficients in the wave equation from partial boundary observations*, ANCIF'05, Dec 5-10 2005, International Workshop on Numerical Analysis and Control of Fluid-Structure Interactions, Chillán, Chile
- Aug 2005 *Desigualdades de Carleman con pesos rotados y aplicación a un problema inverso para la ecuación de ondas*, COMCA 2005, Aug 3-6 2005, Antofagasta, Chile
- Mar 2004 *Control Optimo y Problemas Inversos*, introductory course. UMESAM-IAI Workshop, March, 29-31 2004, CMM, Urban Mobile Emissions in South America Mega Cities: Bogotá, Buenos Aires, Lima, Rio de Janeiro, Santiago, Sao Paulo, research grant IAI at CMM
- Jan 2004 *Some controllability and inverse techniques in geophysics*, First Chilean Workshop on Numerical Analysis of Partial Differential Equations, Jan 13-16, 2004, Concepción, Chile
- Jun 2003 *Inégalités d'observabilité et contrôle insensibilisant d'un modèle océanographique quasi-géostrophique*, Congrès National d'Analyse Numérique, Minisimposium: Point sur la coopération franco-chilienne, Montpellier, Languedoc, France

- Sep 2001 *Rotated and multiple multipliers applied to the controllability in PDE*, CEDYA, Salamanca, Spain
- Sep 2001 *Sobre la controlabilidad nula de la EDP del calor semilineal con coeficientes de difusión discontinuos*, CEDYA 2001, Salamanca, Spain, Co-author
- Jun 2000 *Approximate controllability and homogenization of a semilinear elliptic problem*. Non-Linear Analysis Conference 2000. Courant Institute, New York, U.S.A.
- Jan 2000 *Controllability and homogenization of a semilinear elliptic problem in an hypersurface*. USA-Chile Workshop on Non-linear analysis. Viña del Mar, Chile
- May 1998 *Approximate controllability of some linear models of fluid-structure interaction*. Minisimposium. SIAM Conference on Control and its Applications, Jacksonville, U.S.A.

## Seminar Presentations

- September 2022 *What could we learn from data assimilation to physics informed neural networks?* Charla Iniciativa de Datos e Inteligencia Artificial IDIA-FCFM 29 de Septiembre 2022
- September 2021 *On arterial wall localization based on incompressible fluid's velocity observations* Seminario Núcleo Milenio Cardio-MRI, September 14th, 2021
- January 2021 *Lagrangian epidemiological models and Covid19 spread in Santiago de Chile*. IV webinar dedicado al modelamiento del COVID-19 en Chile. "La segunda ola y la vacunación: predicciones y desafíos". Co-autor. Presentó Tabita Catalán. January 29, 2021.
- June 2020 *Modelamiento y análisis de estrategias de mitigación para el brote COVID-19 en Chile II*. II webinar dedicado al modelamiento del COVID-19 en Chile. "Desafíos para modelar y predecir la Epidemia de COVID-19 en Chile II". Co-autor. Presentó H. Ramírez. June 18–19, 2020.
- April 2020 *Modelamiento y análisis de estrategias de mitigación para el brote COVID-19 en Chile I*. I webinar dedicado al modelamiento del COVID-19 en Chile. "Desafíos para modelar y predecir la Epidemia de COVID-19 en Chile I". Co-autor. Presentó H. Ramírez. April 16–17, 2020.
- Jan 2020 *Mathematical modeling of light-sheet fluorescence microscopy*. U. Gröningen, Neetherlands, 30 jan 2020.
- Jul 2019 *Taller: asimilación de datos y cambio climático*. Iniciativa Beauchef Cambio Climático. Semana de la Ingeniería y Ciencias en el Cambio Climático, Santiago, FCFM, 19–23 ago 2019.
- Jul 2019 *Una intuición matemática de los modelos de reacción-difusión en medicina*. Jornadas de Investigación CIB-Núcleo CardioMR, Olmué, 29–30 jul 2019.
- May 2019 *Data Assimilation and climate change. Where we are?* 80th anniversary of the CNRS. El CNRS en América del Sur: Una historia de integración científica Chile. May 8–10 2019
- Apr 2013 *Inverse & Control Problems in PDE's global Carleman inequalities and applications*. Seminar, Facultad de Matemáticas, PUC, April 2013

- Aug 2013 *A Source Reconstruction Formula for the Heat Equation Using a Family of Null Controls*. Séminaire groupe de travail contrôle, LJLL, Université Pierre et Marie Curie, Paris, France, August 4, 2013
- Dec 2012 *Reconstruction formula for an inverse parabolic source problem using a family of exact controls*. Mathematical Chilean Society SOMACHI 2012, Olmué, Chile, 2012
- Jul 2011 *Reconstruction formula for an inverse parabolic source problem using a family of exact controls*. Departamento de Matemáticas, Universidad de Toulouse, Francia. July 4, 2011
- Jun 2011 *Inverse problems in lithospheric flexure and viscoelasticity*. Basque Center on Applied Mathematics, BCAM, Bilbao, España. June 21, 2011
- Apr 2011 *Inverse problems in lithospheric flexure and viscoelasticity*, Inverse Problem Center, IRPI, Troy-NY, USA. April 11th, 2011
- May 2011 *Modelos matemáticos de crecimiento del axón*. Seminario ICDB, Facultad de Ciencias, Universidad de Chile. May 2011
- Dec 2010 *Applications of inverse problems to lithospheric flexure and viscoelasticity*, AMS SOMACHI 2010, Pucón, December 2010
- Oct 2009 *Introducción a los sistemas dinámicos en biología* Seminario ICDB Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile. 22 Octubre 2009
- Nov 2008 *Generalized Network Component Analysis*, Workshop ICBD, Marbella, Noviembre 2008
- Sep 2008 *Asimilación de datos y aplicaciones a ciencias atmosféricas* 1er Encuentro de Radio-Astronomía y Meteorología en Valparaíso. Ponencia invitada, Valparaíso, Chile, Septiembre 25, 2008
- May 2006 *An inverse problem for the wave equation with one time-dependent partial boundary measurement*, PDE and Inverse Problems Seminar, Department of Mathematics, University of Washington, Seattle, USA
- Jun 2005 *Global Carleman inequalities for the wave equation with rotated multipliers. Application: recovering a coefficient in the wave equation from boundary measurements*, Séminaire Ecole Centrale de Lyon, Lyon, France
- Jun 2005 *Resolution of an inverse problem for the wave equation with rotated Carleman inequalities*, Séminaire Institut Elie Cartan, U. Nancy, Nancy, France
- Apr 2005 *Finite Rank Approximation based method for solving the Radiative Transfer Equation in Stellar Atmosphere Modelling*, seminar at the European Southern Observatory (ESO) with Olivier Titaud, Vitacura, Santiago, [www.sc.eso.org/santiago/science/seminar2005.html](http://www.sc.eso.org/santiago/science/seminar2005.html)
- Jun 2004 *Problemas inversos y de control en transporte-difusión*. Seminario de Fluidodinámica, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile, Santiago, Chile
- Jun 2004 *Un problema inverso para la ecuación de ondas*. Coloquio del Departamento de Ingeniería Matemática, U. de Concepción, Concepción, Chile

- May 2004 *Aplicaciones del control exacto a cero en un modelo 2D de circulación oceanica.* Conferencia en el Coloquio de Matemáticas Aplicadas del IIMA (Instituto de Investigaciones en matemáticas Aplicadas y en Sistemas) de la Universidad Autónoma de México, Ciudad Universitaria, México D.F
- Jun 2002 *Inégalités de Carleman pour l'équation sémilinéaire de la chaleur avec des coefficients discontinues,* Laboratoire de Mathématiques Appliquées, Université de Versailles Saint-Quentin
- Oct 2001 *Control de ondas bajo hipótesis geométricas,* Conferencia Fundación Cámara, Universidad de Sevilla, Sevilla, Spain
- Jun 2001 *Multipliers and controllability,* Journée de Contrôle et Mathématiques Appliquées des Universités de la Lorraine, Metz, France
- Dec 2000 *Desigualdades de Carleman,* Coloquio del Departamento de Matemáticas de la Facultad de Ciencias de la U. de Chile
- Nov 2000 *Controlabilidad exacta a cero de la ecuación del calor con coeficientes discontinuos,* Encuentro CMM/Concepción, FONDAPE de Modelamiento Matemático
- Nov 2000 *Controlabilité approchée et continuation unique de quelques modèles d'interaction fluide-structure,* Séminaire U. de Metz, France
- Oct 2000 *Un problème inverse elliptique sémilinéaire: contrôlabilité et homogénéisation,* Séminaire du LCPC Laboratoire des Matériaux et des Structures du Génie Civil UMR CNRS
- Sep 1999 *Controlabilidad aproximada de un sistema membrana-fluido cerca de ángulos rectos.* Seminario Departamento de Matemáticas, Facultad de Ciencias, Universidad del Bío-bío. Concepción, Chile
- Sep 1999 *Aspectos teóricos y numéricos del control de fluidos y fluido-estructura.* Seminario Departamento de Ingeniería Matemática, Facultad de Ciencias Físicas y Matemáticas, Universidad de Concepción. Concepción, Chile
- Jun 1999 *Géométrie et contrôlabilité approchée de systèmes fluide-structure.* Séminaire Groupe de Recherche Fluide-Structure dirigé par Mme. Bernardi et Y. Maday. Laboratoire d'Analyse Numérique (actually Laboratoire Jacques-Louis Lions), Université Pierre et Marie Curie – Paris VI
- Nov 1998 *Multiplicateurs et contrôle.* Réunion de Recherche. Siège à Paris de Dassault Aviation. Groupe de Recherche sur le contrôle a future des avions en collaboration avec l'Ecole Polytechnique
- Oct 1998 *Casos geométricos de controlabilidad aproximada de sistemas fluído-estructura.* Seminar. Departamento de Matemática Aplicada de la Universidad Complutense de Madrid
- Nov 1997 *Control of a linear model in solid-fluid interaction.* Seminar. Institut für Mathematik, Karl-Franzens-Universität, Graz, Austria
- Nov 1997 *Boundary Controllability of the Stationary Stokes System.* Seminar. Institut für Mathematik, Karl-Franzens-Universität, Graz, Austria
- May 1997 *Contrôlabilité frontière approchée du système de Stokes stationnaire observé sur une courbe intérieure.* Congreso Nacional de Analisis Numérico, Ardèche, France



Aug 1996 *Controlabilité approchée du système de Stokes sur une courbe*. Seminar. Centre de  
Mathématiques Appliquées, Ecole Polytechnique, Paris, France

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