

Introduction to the special issue in honor of Pedro Eduardo Ubilla Lopez

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*Dedicated to Professor Pedro Ubilla
on the occasion of his 60th birthday*

Abstract. This special issue of *Matemática Contemporânea* celebrates the 60th birthday of Professor Pedro Ubilla López and pays tribute to his remarkable contributions to the field. Pedro has made significant contributions to the mathematical community through his authorship of at least 76 scientific articles, as well as his dedication to popularizing mathematics and nurturing young talents in the field.

Keywords: P. Ubilla.

1 Biography

It is our great pleasure to introduce this special issue in honor of Pedro Ubilla. Pedro was born in Santiago, Chile, on January 9th, 1961. He studied secondary education at Liceo de Hombres in the district of Quinta Normal, where he shared his passion for mathematics with his friend Freddy San Martín.

He was granted a Bachelor's degree in Mathematics at the Pontificia Universidad Católica of Valparaíso (PUCV) in April 1985. There, he met great friends, Hernán Pinto and Eugenio Saavedra (R.I.P). Later on, Eugenio became a colleague at the University of Santiago de Chile (USACH). When he was finishing his studies at PUCV, a friend (Juan Carlos Ceballos) encouraged him to find out more about the Master's in Mathematics degree at Universidad de Santiago de Chile. Back then, Pedro Ubilla had two possibilities: to study computer engineering or to pursue a master's degree in mathematics. The Director of the Computer Engineering program sent him to talk to the Director of the Master's Program at that time, Professor Jorge Billeke, who welcomed him and made him the following offer:

“You can participate as a listener. If it is ok with you, we will hire you as a teacher for some hours, and you will be waived your tuition fee.”

On that, Pedro commented, “the idea of being a university professor excited me a lot“. In November 1987, he completed the Master of Science program with a Specialty in Mathematics at Universidad de Santiago de Chile under the direction of Professor Ioana Cioranescu. His dissertation work was entitled “Bounded Uniform Cosine Semigroups and Families“. Subsequently, he had to decide on the continuity of his studies in the area, for which Professor Ioana recommended him continuing his studies in the theory of semigroups of operators with D. Lutz, a professor from the Essen University.

However, Professor Rafael Labarca also suggested him to pstudy PDE at UNICAMP-BR with professor Djairo de Figueiredo, and to apply for a

CNPq-BR scholarship (financial support for which he always expresses his appreciation). Thus, he began his doctorate studies at UNICAMP under the supervision of Professor Djairo. In April 1992, he defended his thesis entitled “Some results of multiplicity of solutions for quasilinear elliptic equations“.

During his doctoral period, Pedro Ubilla exhibited an outstanding performance:

“The first thing I did when I arrived was to see Djairo to tell him that I wanted to study with him, and he replied, ‘very well, but first you have to take the basic courses and the qualifying exam’. Well, after passing the exam (Professor Paques told me it was the best exam he had ever seen), I started studying with Djairo, I learned a lot from him, not just about mathematics, because in addition to that he was a great person.“

When he arrived at UNICAMP, in March 1988, he became friends with Daniel Cordeiro and Marco Aurélio Souto, and later, with João Marcos do Ó and Sebastián Lorca (the last also from USACH). Regarding his relationship with them, after his arrival in Campinas, Pedro expressed the following:

“A beautiful friendship was born between Daniel Cordeiro, Marco Aurélio Souto, João Marcos do Ó and Sebastián, which we keep to this day”.

At UNICAMP, there was always a large number of collaborators visiting Professor Djairo de Figueiredo visiting him, and Pedro took advantage of the opportunities that this scientific environment offered. He said:

“Part of the large number of visitors to Djairo were Bernhard Ruf and Jean Pierre Gossez with whom, after my doctorate, I was lucky enough to work and enjoy their friendship”.

During his years of study, he was granted 8 scholarships from funding agencies in Chile and Brazil, such as CNPq-BR and FAPESP-BR. After completing his doctorate, he began a postdoctoral internship on May 1st,

1992 and continued working at UNICAMP until February 28th, 1993, when he returned to Chile to work at the Universidad Católica del Norte.

He began his job as professor at Universidad de Santiago de Chile in August 1984, where he remained until August 1993. In addition, he worked as an Assistant Professor at UNICAMP between March and December 1992. In March 1993, he took up the position of Professor in the Mathematics Department at the Universidad Católica del Norte, where he remained until July 1994, to then return to USACH to assume the position of Professor in the Mathematics and Computer Science Department, where he remains to this day. In his teaching career, he has taught several undergraduate and postgraduate courses. He has also actively undertaken scientific research activities since the end of the 1980s, when he had his first work, developed during his master's degree, published in 1989 in collaboration with Ioana Cioranescu. Since then, his contributions have continued on topics such as problems with concavo-convex nonlinearities with coefficients that change sign, radial problems that pose growth hypotheses about nonlinearities only in neighborhoods of the origin, problems with supercritical nonlinearities, problems with dependency of gradient, and problems considering the Schrödinger operator with the zero potential at infinity. To this date, he has written 76 scientific articles on these research topics for specialized journals with international circulation, and has conducted joint work with about 30 co-authors, in publications such as:

1. M. GARCÍA-HUIDOBRO, P. UBILLA, Multiplicity of solutions for a class of nonlinear second-order equations, *Nonlinear Anal.* **28** (1997), No. 9, 1509–1520.
2. D. G. DE FIGUEIREDO, J-P. GOSSEZ, P. UBILLA, Local superlinearity and sublinearity for indefinite semilinear elliptic problems. *J. Funct. Anal.* **199** (2003), no. 2, 452–467.
3. S. LORCA, P. UBILLA, Symmetric and nonsymmetric solutions for an elliptic equation on \mathbb{R} . *N. Nonlinear Anal.* **58** (2004), no. 7-8,

961–968.

4. J. M. DO Ó, S. LORCA, P. UBILLA, Local superlinearity for elliptic systems involving parameters. *J. Differential Equations* **211** (2005), no. 1, 1–19.
5. D. G. DE FIGUEIREDO, J-P. GOSSEZ, P. UBILLA, Multiplicity results for a family of semilinear elliptic problems under local superlinearity and sublinearity. *J. Eur. Math. Soc. (JEMS)* **8** (2006), no. 2, 269–286.
6. J. M. DO Ó, S. LORCA, J. SÁNCHEZ, P. UBILLA. Positive solutions for a class of multiparameter ordinary elliptic systems. *J. Math. Anal. Appl.* **332** (2007), no. 2, 1249–1266.
7. F. BROCK, L. ITURRIAGA, P. UBILLA, A multiplicity result for the p -Laplacian involving a parameter. *Ann. Henri Poincaré* **9** (2008), no. 7, 1371–1386.
8. D.G. DE FIGUEIREDO, J-P. GOSSEZ, P. UBILLA, Local “superlinearity” and “sublinearity” for the p -Laplacian. *J. Funct. Anal.* **257** (2009), no. 3, 721–752.
9. L. ITURRIAGA, E. MASSA, J. SÁNCHEZ, P. UBILLA, Positive solutions of the p -Laplacian involving a superlinear nonlinearity with zeros. *J. Differential Equations*, **248** (2010), no. 2, 309–327.
10. L. Iturriaga, S. Lorca, P. Ubilla, A quasilinear problem without the Ambrosetti-Rabinowitz-type condition. *Proc. Roy. Soc. Edinburgh Sect. A* **140** (2010), no. 2, 391–398.
11. J.M. do Ó, B. Ruf, P. Ubilla, On supercritical Sobolev type inequalities and related elliptic equations. *Calc. Var. Partial Differential Equations.* **55** (2016), no. 4, Art. 83, 18 pp.

12. D. G. DE FIGUEIREDO, J-P. GOSSEZ, P. UBILLA, Nonhomogeneous Dirichlet problems for the p -Laplacian. *Calc. Var. Partial Differential Equations*. **56** (2017), no. 2, Paper No. 32, 19 pp.
13. P. CERDA, M. SOUTO, P. UBILLA, Some non-local logistic population model with non-zero boundary condition. *Commun. Contemp. Math.* **20** (2018), no. 8, 1750075, 13 pp.
14. D. L. CECÍLIO, C. CUEVAS, J. MESQUITA, P. UBILLA, Existence of a positive solution and numerical solution for some elliptic superlinear problem. *J. Differential Equations*. **266** (2019), no. 2-3, 1338–1356.
15. D. G. DE FIGUEIREDO, J-P. GOSSEZ, H. RAMOS QUOIRIN, P. UBILLA, Elliptic equations involving the p -Laplacian and a gradient term having natural growth. *Rev. Mat. Iberoam.* **35** (2019), no. 1, 173–194.
16. J. F. DE OLIVEIRA, J. M. DO Ó, P. UBILLA, Existence for a k -Hessian equation involving supercritical growth. *J. Differential Equations* **267** (2019), no. 2, 1001–1024.
17. R. CLEMENTE, J. M. DO Ó, P. UBILLA, On supercritical problems involving the Laplace operator. *Proc. Roy. Soc. Edinburgh Sect. A*. **151** (2021), no. 1, 187–201.
18. J.F. DE OLIVEIRA, P. UBILLA, Admissible solutions to Hessian equations with exponential growth. *Rev. Mat. Iberoam.* **37** (2021), no. 2, 749–773.
19. J. A. CARDOSO, P. CERDA, D. PEREIRA, P. UBILLA, Schrödinger equations with vanishing potentials involving Brezis-Kamin type problems. *Discrete Contin. Dyn. Syst.* **41** (2021), no. 6, 2947–2969.
20. E. TOON, P. UBILLA, Hamiltonian systems of Schrödinger equations with vanishing potentials. *Commun. Contemp. Math.* **24** (2022), no. 1, Paper No. 2050074, 20 .

21. J.M. do Ó, B. Ruf, P. Ubilla, A critical Moser type inequality with loss of compactness due to infinitesimal shocks. *Calc. Var. Partial Differential Equations*. **62** (2023), no. 8.

In total, their works have amassed at least 818 citations from various international researchers, attributed to 583 authors.

All his works and results are undoubtedly the result of more than 50 scientific research visits to different institutions around the world, including the Universidade Estadual de Campinas (Campinas, Brazil), Free University of Brussels (Belgium), Courant Institute (EE.UU.), New York University (EE.UU.), Universidad Autónoma de Madrid (Spain), Politecnico di Milano (Italy), University of Milan (Italy), Universidade de São Paulo (São Carlos-Brazil), Universidad Nacional de Córdoba (Argentina), Universidade Federal de Paraíba (João Pessoa, Brazil), Universidade Federal de Campina Grande (Campina Grande, Brazil), Universidade de Brasília (Brasília, Brazil).

These scientific visits are coupled with more than 50 conference papers presented at the international conferences held by various institutions, such as:

- Multiplicity Results for Quasilinear Elliptic Equations, “36 Seminário Brasileiro de Análise“, Instituto Tecnológico de Aeronáutica de Sao José dos Campos, Brazil (November 19th to 21th, de Novembro de 1992).
- Existence of Nonnegative Solutions for a Quasilinear Elliptic Dirichlet Problem, International Conference on “Reaction Diffusion System“, Università di Trieste, Italy (October 2nd to 07th de Outubro de , 1995).
- Nonnegative solutions for some Indefinite Semilinear Elliptic Problems (jointwork withcom J. P. Gossez ande Djairo Figueiredo), Partial Differential Equations workshop, Italy, 2001.

- Non-homogeneous elliptic equations in exterior domains (jointwork withcom J. M. do Ó, S. Lorca ande J. Sánchez), *Topological and variational Methods in Partial Differential Equations*, Mexico, 2005.
- Multiplicity results for a family of semilinear elliptic problems under local superlinearity and sublinearity (jointwork withcom J-P. Gossez ande D. de Figueiredo), *New Directions in PDE 2005*, Canada, 2005.
- Superlinear Systems of Second-Order ODE's. (jointwork withcom D. de Figueiredo), *VII Conferencia de las Americas en Ecuaciones Diferenciales y Análisis No Lineal*, Universidad de Cartagena, Colombia, 2007.
- Superlinear Elliptic Systems with dependence on the gradient, II ENAMA, Joao Pessoa, Brazil (November 5th ato 7th de Novembro de, 2008).
- On a class of Kirchhoff elliptic equations involving critical growth and vanishing potentials IX Workshop on Nonlinear Differential Equations, September 4th, 2017 to September 8th, 2017, Universidade de Brasília, Brasília, Brazil.
- Existence of positive solutions of Schrödinger equations with vanishing potentials, 6th Workshop on Analysis and Partial Differential Equations, November 28th to November 30th, 2018, Universidade Federal de Sergipe, Aracaju, Brazil.

Pedro also started academic supervision activities in 1995 and has guided students of all levels. Among his students are:

- Edson Arrázola – Master degree in Mathematics (1995).
- Rubén Rojas – Master degree in Mathematics (1996).
- Christian Cáceres – Bachelor of Mathematics (1997).
- Miguel Muñoz – Bachelor of Mathematics (1997).

- Rodrigo Pérez – Bachelor of Mathematics (1997).
- Leonelo Iturriaga – Bachelor of Mathematics / Doctorate (2001–2005).
- Justino Sánchez – Master degree / Doctorate (2001–2004).
- Patricio Cerda – Bachelor of Mathematics / Doctorate (2006–2013).
- Omar Ramos – Bachelor of Mathematics (2011).
- Juan Arratia – Master degree / Doctorate (2014–2017).

He also supervised the following postdoctoral internships at Universidad de Santiago de Chile:

- Justino Sánchez – Universidad de la Serena – Chile (2008)
- Eugenio Massa – Universidade de São Paulo (São Carlos) – Brazil (2008).
- Leonelo Iturriaga – Universidad de Tarapacá – Chile (2010).
- Humberto Ramos – Free University of Brussels – Belgium (2010 – 2012).
- Eduard Toon - Universidade Federal de Juiz de Fora - Brazil (2017–2018).
- Denilson Pereira – Universidade Federal de Campina Grande – Brazil (2018–2019).
- Rodrigo Clemente – Universidade Federal Rural de Pernambuco – Brazil (2019).

Pedro Ubilla was a member of the Scientific Committee of Universidad de Santiago de Chile for a long time. He has also been the chair of the Mathematics Specialty at the Master's in Science program for several terms

and occasions. He also led the Mathematics Specialty of the Doctorate Program in Sciences from October 2007 to May 2010. Since 1995, Pedro Ubilla has coordinated more than 15 scientific research projects funded by FONDECYT.

Pedro had three children and a grandson from his first marriage to Verónica Aranguiz (R.I.P). His first child, Pedro, was born in 1986. Five years later, his daughter Natalia was born in 1991, followed by his daughter Katherine in 1993. In 2013, his grandson Altair was born. Sadly, Pedro's mother, Adriana, passed away in June 2022. Currently, Pedro lives with his partner, Haíssa Tavares.