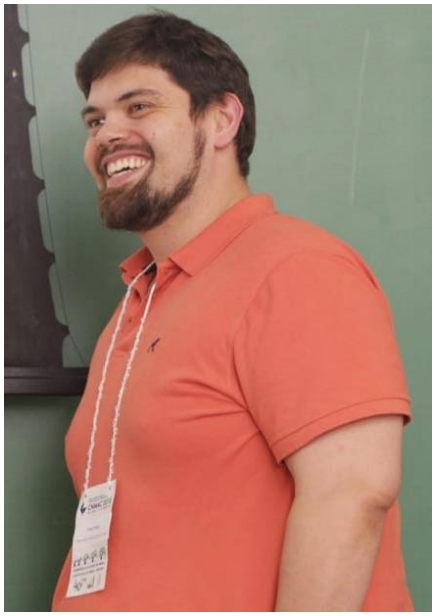

Felipe Fidalgo

Assistant Professor

Universidade Federal de Santa Catarina

School of Technology, Exact Sciences and Education

Department of Mathematics

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Research Interests

- Distance Geometry and Its Applications
- Quaternions and Applications
- Clifford Algebras and Applications
- Molecular Geometry
- Bioinformatics
- Discrete Mathematics
- Optimization
- Operational Research

Biography

Felipe Fidalgo was born in Andradina, state of Sao Paulo, Brazil, on February, 1st, 1987. He is a Bachelor of Mathematics (2008) and M.Sc. (2011) and Ph.D. (2015) in Applied Mathematics at University of Campinas, whose main research themes were Distance Geometry with applications in Molecular Geometry and Clifford Algebras. Since 2015, he is professor of the Department of Mathematics at Blumenau Campus of the Universidade Federal de Santa Catarina, leading research projects, teaching and supervising projects both in undergraduate and in graduate levels and developing relevant administration tasks.

Work experience

Assistant Professor — **Oct/2015 - today**

Department of Mathematics
School of Technology, Exact Sciences and Education (CTE)
Campus of Blumenau, Blumenau, Brazil
Universidade Federal de Santa Catarina (UFSC)

Fidalgo lectures mathematical courses for Mathematics, Chemistry and Engineering undergraduate programs which are held in the campus. Also, he works as a lecturer, supervisor, co-coordinator (two terms) and coordinator (two terms) in PROFMAT (Graduate), which is an professional Master's in Mathematics. And, he develops research projects which involve colleagues and undergraduate and graduate students; supervisions are involved in this task. His position is as Assistant Professor, the initial full-time one in the tenure track of the Federal system (public) of Universities in Brazil.

Instructor — **May/2015 - Sep/2015**

Department of Mathematics
School of Engineering of Ilha Solteira (FEIS)
Campus of Ilha Solteira, Ilha Solteira, Brazil
Universidade Estadual "Julio de Mesquita Filho" (UNESP)

He was hired to lecture Calculus courses for the Engineering undergraduate programs in this campus as a part-time substitute instructor, a non-ternure-track position in a public institution.

Instructor — **Feb/2014 - Oct/2015**

Faculdades Integradas "Rui Barbosa" (FIRB)
Andradina, Brazil

He lectured Calculus, Linear Algebra, Differential Equations, Numerical Methods and Financial Mathematics for Engineering and Business undergraduate programs. It is a non-ternure-track position in a private institution. This was the first teaching experience of him in academic courses.

Prizes

- Nominee for Hestenes' Prize (2018)

  Second position was awarded in the finale of the Hestenes Prize (top 3) during AGACSE 2018 in Campinas, Brazil.

- Nominee for DGP "Top Five Papers" (2013)

  Fourth position was awarded in the finale of the DGP "Top Five Papers" during Workshop on Distance Geometry and Applications (DGP) 2013 in Manaus, Brazil.

Education

03/2011 - 02/2015

Applied Mathematics (Ph.D)

University of Campinas (UNICAMP)

PhD's thesis:
"Dividing-and-conquering with symmetries in Distance Geometry"

Supervisor: Prof. Carlile Lavor, PhD
Awarded on: Feb. 27th, 2015

Examiners:
Sueli Costa, Eduardo Miqueles, Giuliano Guardia and Tiberius Bonates.

Distance Geometry • Clifford Algebra

03/2009 - 05/2011

Applied Mathematics (M.Sc)

University of Campinas (UNICAMP)

Master's thesis:
"Algorithms for problems in Molecular Geometry"

Supervisor: Prof. Carlile Lavor, PhD
Awarded on: May 13rd, 2011

Examiners:
Luiz Ochi and Márcia Ruggiero.

Distance Geometry • Bioinformatics

03/2005 - 12/2008

Mathematics (B.Sc)

Universidade Paulista "Julio de Mesquita Filho" (UNESP)

Publications

- **Fidalgo, F.** & Castelani, E.V. & Philippi, G. (2023). "A numerical-and-computational study on the impact of using Quaternions in the Branch-and-Prune Algorithm for exact discretizable distance geometry problems". *Compuational Optimization and Applications*.

- De Camargo, V.S. & Castelani, E.V. & Fernandes, L.A.F. & **Fidalgo, F.** (2019). "Geometric Algebra to Describe the Exact Discretizable Molecular Distance Geometry Problem for an Arbitrary Dimension". *Advances in Applied Clifford Algebra (AACA)* 29(4), 75.

- **Fidalgo, F.** (2018).
"Using quaternion geometric algebra for efficient rotations in the branch-and-prune algorithm to solve the discretizable molecular distance geometry problem". In: *Proceedings of the 7th Conference on Applied Geometric Algebra in Computer Science and Engineering (AGACSE)*, Campinas, Brazil, July 23-27. (Nominee to the Hestenes Prize and awarded with the second position)

- **Fidalgo, F.** & Gonçalves, D.G. & Lavor, C. & Liberti, L. & Mucherino, A. (2018). "A symmetry-based splitting strategy for discretizable distance geometry problems". In: *Journal of Global Optimization (JOGO)* 71, 717-733. (D.O.I. 10.1007/s10898-018-0610-9)

- Rodriguez, J.E.A. & **Fidalgo, F.** (2015).
"The problem of Square-Base Pyramid". In: *C.Q.D. Electronic Paulista Journal* 4, 47-54.

- **Fidalgo, F.** & Lavor, C. (2015).
"Deciding Directions for the Branch-and-Prune Algorithm using gaps - a worst-case analysis". In: *Proceedings of the Mathematical Methods and Modeling of Biophysical Phenomena Workshop (BIOMATH)*, Cabo Frio, Brazil, March 2-7. (Abstract)

- **Fidalgo, F.** & Rodriguez, J.E.A. (2014).
"A new approach to split Discretizable Molecular Distance Geometry Problem using gaps". In: *Proceedings of XXXV National Conference on Applied and Computational Mathematics (CNMAC)*, Natal, Brazil, September 08-12.

- Rodriguez, J.E.A. & **Fidalgo, F.** (2014).
"The problem of Square-Base Pyramid". In: *Proceedings of XXXV National Conference on Applied and Computational Mathematics (CNMAC)*, Natal, Brazil, September 08-12.

- **Fidalgo, F.** & Rodriguez, J.E.A. (2014).
"Exploiting Symmetries in a divide-and-conquer approach for solving the DMDGP". In: *Proceedings of the Many Faces of Distances*, Campinas, Brazil. (Expanded Abstract)

- **Fidalgo, F.** & Rodriguez, J.E.A. (2013).
"Quaternions as a tool for merging multiple realization trees". In: *Proceedings of the Workshop on Distance Geometry and Applications (DGA)*, Manaus, Brazil.

- **Fidalgo, F.** & Maioli, D. & Abreu, E. (2013).
" Updated T Algorithm for the resolution of Molecular Distance Geometry Problems by means of linear systems". In: *Proceedings of the Workshop on Distance Geometry and Applications (DGA)*, Manaus, Brazil.

- **Fidalgo, F.** & Maioli, D. & Abreu, E. & Lavor, C. (2012).
"A numerical formulation for the resolution of Molecular Distance Geometry Problems". In: *Proceedings of the joint Conference Congresso Latino-Iberoamericano de Investigacion Operativa/Simpósio Brasileiro de Pesquisa Operacional (CLAIO/SBPO)*, Rio de Janeiro, Brazil.

- **Fidalgo, F.** (2012).
"Algoritmos para a Resolução de Problemas de Geometria Molecular". In: *Proceedings of XVI Escuela Latinoamericana de Verano en Investigación Operativa (ELAVIO)*, Bento Gonçalves, Brazil. (Abstract)

Research Projects

- An algebraic-geometric-computational study of Clifford Algebras and Distance Geometry (2022 – now)
- Theory and Practice in Distance Geometry and Clifford Algebras with Applications (2019 – 2022)
- Distance Geometry and Geometric Algebras: new geometric, computational and application perspectives (2018 – 2019)
- New geometric and computational strategies through adaptations of the Branch-and-Prune Algorithm for the resolution of the Discretizable Molecular Distance Geometry Problem (2016 – 2018)

Grants

- FAPESC grants for the organization of the 'Regional Conference in Computational and Applied Mathematics' ($\sim$ 19 000 BRL, 2019-2020)
- CNPq PhD Scholarship ($\sim$ 105 000 BRL, 2011-2015)
- CNPq PhD Additional Budget for Traveling and Buying Consuming Material ($\sim$ 18 000 BRL, 2011-2015)
- CNPq MSc Scholarship ($\sim$ 36 000 BRL, 2009-2011)
- ELAVIO Full Grants (2012)
- IMPA "IV Scientific Beginning Conference" Full Grants (2008)

Administrative Responsabilities

- Coordinator of Regional 12 of Applied and Computational Mathematics Brazilian Society (SBMAC) (2024 - now)
- Supervisor of the Applied and Computational Mathematics Laboratory (LabMAC) at UFSC Blumenau (2023 - now)
- Member of the campus Research and Graduation Chamber (2022 - now)

- Coordinator in PROFMAT, a (graduate) Network Professional Master Program in Mathematics for Education (2021 - now)
- Coordinator of the CNPq Research Group "UFSC - Applied and Computational Mathematics" (2017 - now)
- Sub-coordinator of Regional 12 of Applied and Computational Mathematics Brazilian Society (SBMAC) (2020 - 2024)
- Member of Internal Committee for grants for Scientific Beginners - CNPq/PIBIC (2020 - 2022)
- Member of the Campus Pedagogical Committee (2019 - 2021)
- Sub-coordinator in PROFMAT, a (graduate) Network Professional Master Program in Mathematics for Education (2017 - 2021)
- Member of Undergraduate Course Committee - Mathematics (2016 - 2018)
- Member of Undergraduate Course Structuring Committee - Mathematics (2016 - 2018)
- Member of Campus Funding Grant Committee (2016 - 2017)

Editorial Responsabilities

- Reviewer for the journal "Advances in Applied Clifford Algebra", 2022 - now
- Reviewer for the journal "Computational and Applied Mathematics", 2020 - now
- Reviewer for the journal "Algorithmica", 2020 - now
- Reviewer for the journal "European Journal of Operation Research", 2019 - now
- Reviewer for the journal "Trends in Applied and Computational Mathematics", 2018 - now.
- Referee for the "Annals of the National Congress of Applied and Computational Mathematics (CNMAC)", 2017 - now
- Referee for the "Annals of the Brazilian Symposium of Operational Research (SBPO)", 2015 - 2019

Conference Organization

- Co-chair of the "Minisymposium on Distance Geometry" during CNMAC 2024, Porto de Galinhas, Brazil
- Co-chair of the "Optimization and Applications Session" during CBJME 2024, Belo Horizonte, Brazil
- Co-chair of the "Minisymposium on Distance Geometry" during CNMAC 2023, Bonito, Brazil
- Co-chair of the "Minisymposium on Distance Geometry and Geometric Algebra" during CNMAC 2021, online, Brazil
- General chair of the "Regional Conference in Computational and Applied Mathematics" 2019, Blumenau, Brazil
- Co-chair of the "Minisymposium on Theory and Practice of Geometric Algebra" during CNMAC 2019, Uberlandia, Brazil
- Co-chair of the "Minisymposium on Distance Geometry and Applications" during CNMAC 2019, Uberlandia, Brazil
- Co-chair of "Mathematics Day Fair" 2016, Blumenau, Brazil

Conference Attendance and Talks

- **V Brazilian Conference of Young Researchers on Pure and Applied Mathematics and Statistics**

  Federal University of Minas Gerais. Belo Horizonte, Brazil. (2024)

- **XLIII National Congress of Applied and Computational Mathematics (CNMAC 2024)**

  Federal University of Pernambuco. Porto de Galinhas, Brazil. (2024)

  Co-chair of Mini-symposium on Distance Geometry.

- **XLII National Congress of Applied and Computational Mathematics (CNMAC 2023)**

  Federal University of Mato Grosso do Sul. Bonito, Brazil. (2023)

  Co-chair of Mini-symposium on Distance Geometry.

  Invited Lecturer on Mini-symposium on Distance Geometry: *"Some remarks about the resolution of DMDGPs using Quaternions"*.

- **IV Brazilian Conference of Young Researchers on Pure and Applied Mathematics and Statistics**

  Federal University of Paraíba. João Pessoa, Brazil. (2022)

  Invited Lecturer on Thematic Session on Continuous Optimization I: *"Quaternions to solve DMDGPs with protein instances"*.

- **33rd Brazilian Colloquium of Mathematics** *(Online)*

  National Institute of Pure and Applied Mathematics. Rio de Janeiro, Brazil. (2021)

- **XL National Congress of Applied and Computational Mathematics (CNMAC 2021)** *(online)*

  Federal University of Mato Grosso do Sul. Campo Grande, Brazil. (2021)

  Co-chair of Mini-symposium on Distance Geometry and Geometric Algebra.

  Invited Lecturer on Mini-symposium on Distance Geometry and Geometric Algebra: *"Quaternion Algebra to Distance Geometry Problems"*.

- **Mini-symposium on Sensor Network Localization and Dynamical Distance Geometry.** *(online)*

  Fields Institute for Research in Mathematical Sciences, Toronto, Canada (2021)

- **The 8th Conference on Applied Geometric Algebras in Computer Science and Engineering (AGACSE 2021)** *(online)*

  Brno University of Technology. Brno, Czech Republic. (2021)

  Accepted contribution: *"Conformal Geometric Algebra applied to the Discretizable Molecular Distance Geometry Problem with arbitrary dimension"*.

- **Mini-symposium on Sensor Network Localization and Dynamical Distance Geometry.** *(online)*

  Fields Institute for Research in Mathematical Sciences, Toronto, Canada (2021)

- **Workshop on Distance Geometry, Semidefinite Programming and Applications.** *(online)*

  Fields Institute for Research in Mathematical Sciences, Toronto, Canada (2021)

- **XXXIX National Congress of Applied and Computational Mathematics (CNMAC 2019)**

  Federal University of Uberlandia. Uberlandia, Brazil. (2019)

  Co-chair of Mini-symposium on Theory and Practice in Geometric Algebra.

  Co-chair of Mini-symposium on Distance Geometry and Applications.

  Invited Lecturer on Mini-symposium on Theory and Practice in Geometric Algebra: *"Geometric Algebra to describe the exact Discretizable Molecular Distance Geometry Problem for an arbitrary dimension"*.

- **The 7th Conference on Applied Geometric Algebras in Computer Science and Engineering (AGACSE 2018)**

  University of Campinas. Campinas, Brazil. (2018)

  Accepted and awarded contribution: *"Using quaternion geometric algebra for efficient rotations in the branch-and-prune algorithm to solve the discretizable molecular distance geometry problem"*.

- **III Brazilian Conference of Young Researchers on Pure and Applied Mathematics and Statistics**

  Federal University of Parana. Curitiba, Brazil. (2018)

  Invited Lecturer: *"Um método dividir-e-conquistar para um Problema de Geometria de Distâncias"*.

- **XXXVIII National Congress of Applied and Computational Mathematics (CNMAC 2018)**

  University of Campinas. Campinas, Brazil. (2018)

  Invited Lecturer on Mini-symposium on Distance Geometry and Applications: *"Uma estratégia para a resolução de um DDGP usando partição em problemas menores"*.

- **I Blumenau Mathematics Conference**

  Federal University of Santa Catarina. Blumenau, Brazil. (2016)

- **Mathematical Methods and Modeling of Biophysical Phenomena**

  IMPA. Cabo Frio, Brazil. (2015)

- **Many Faces of Distances Workshop**

  University of Campinas. Campinas, Brazil. (2014)

  Accepted contribution: *"Exploiting Symmetries in a divide-and-conquer approach for solving the DMDGP"*.

- **XXXV National Congress of Applied and Computational Mathematics (CNMAC 2014)**

  Federal University of Rio Grande do Norte. Natal, Brazil. (2014)

  Accepted contribution: *"A new approach to split instances of the Discretizable Molecular Distance Geometry Problem"*.

- **Workshop on Distance Geometry and Applications (DGA 2013)**

  Federal University of Amazonas. Manaus, Brazil. (2013)

  Accepted contribution: *"Quaternions as a tool for merging multiple realization trees"*.

  Accepted contribution: *"Updated T Algorithm for the resolution of Molecular Distance Geometry Problems by means of linear system"*.

- **Congresso Latino-Americano de Investigacion Operativa (CLAIO 2012)**

  Fundação Getúlio Vargas. Rio de Janeiro, Brazil. (2012)

  Accepted contribution: *"A numerical formulation for the resolution of Molecular Distance Geometry Problems".*

Teaching Experience

1. Graduate Courses
   - MA 13 - Geometry
     From: 07/2024 - To: 12/2024
   - MA 23 - Analytic Geometry
     From: 02/2023 - To: 07/2023
   - MA 12 - Discrete Mathematics (04/2021 - 08/2021)
   - MA 14 - Arithmetics (08/2018 - 12/2018)
2. Undergraduate Courses
   - Algebra II - Mathematics Course (03/2024 - 06/2024)
   - Algebra I - Mathematics Course (08/2023 - 12/2023)
   - Algebra I - Mathematics Course (08/2022 - 12/2022)
   - Algebra II - Mathematics Course (04/2022 - 07/2022)
   - Algebra I - Mathematics Course (10/2021 - 03/2022)
   - Foundations of Mathematics - Mathematics Course (10/2021 - 01/2022)
   - Foundations of Mathematics - Mathematics Course (06/2021 - 10/2021)
   - Foundations of Mathematics - Mathematics Course (02/2021 - 05/2021)
   - Algebra I - Mathematics Course (02/2021 - 05/2021)
   - Foundations of Mathematics - Mathematics Course (03/2020 - 12/2020)
   - Numerical Methods - Mathematics Course (03/2020 - 12/2020)
   - Analytic Geometry and Linear Algebra - Control and Automation Engineering (08/2019 - 12/2019)
   - Calculus IV - Mathematics Course (08/2019 - 12/2019)
   - Geometry I - Mathematics Course (03/2019 - 07/2019)
   - Calculus III - Materials Engineering (03/2019 - 07/2019)
   - Calculus III - Textile Engineering (03/2019 - 07/2019)
   - Analytic Geometry and Linear Algebra - Materials Engineering (07/2018 - 12/2018)
   - Algebra II - Mathematics Course (07/2018 - 12/2018)
   - Analytic Geometry and Linear Algebra - Control and Automation Engineering (02/2018 - 07/2018)
   - Geometry I - Mathematics Course (02/2018 - 07/2018)
   - Calculus III - Textile Engineering (07/2017 - 12/2017)
   - Geometry I - Mathematics Course (07/2017 - 12/2017)
   - Calculus II - Materials Engineering (03/2017 - 07/2017)
   - Analytic Geometry and Linear Algebra - Textil Engineering (03/2017 - 07/2017)
   - Introduction to Calculus - Mathematics Course (08/2016 - 12/2016)
   - Linear Algebra - Control and Automation Engineering (08/2016 - 12/2016)
   - Introduction to Calculus - Mathematics Course (03/2016 - 07/2016)
   - Calculus II - Chemistry Course (03/2016 - 07/2016)
   - Applied Statistcs - Mathematics Course (10/2015 - 12/2015)
   - Calculus I - Chemistry Course (10/2015 - 12/2015)

Supervision

1. Masters Dissertation
   (a) Guilherme Furlan (2024 - now)
   (b) Luiz Fernando Ribeiro de Almeida (2024 - now)
   (c) Vera Lucia dos Santos (2024 - now)
   (d) Michel Borchardt (2022 - 2024)
   (e) Samuel Haag (2020 - 2022)
2. Undergraduate Course Conclusion Dissertation
   (a) Guilherme Philippi (2023 - 2024)
   (b) Valdir Wille Neto (2020 - 2021)
3. Scientific Beginning Project
   (a) Raphael Luciani (2024 - now)
   (b) Luigi Galvão (2023 - now)
   (c) Aline Thaise Zermiani (2021 - now)
   (d) Guilherme Philippi (2023 - 2024) - PIBIC CNPq Grants
   (e) Guilherme Philippi (2022 - 2023) - PIBIC CNPq Grants
   (f) Guilherme Philippi (2021 - 2022) - PIBIC CNPq Grants
   (g) Guilherme Philippi (2020 - 2021) - PIBIC CNPq Grants
   (h) Guilherme Philippi (2019 - 2020) - PIBIC CNPq Grants
   (i) Guilherme Philippi (2018 - 2019) - PIBIC CNPq Grants
   (j) Guilherme Philippi (2017 - 2018)
   (k) Guilherme Abreu (2017 - 2018)
   (l) Lucas Pereira (2016 - 2018)
   (m) Ricardo Emanuel Müller (2016 - 2018)
4. Internship
   (a) Nicolas Fernandes dos Santos (2024 - now)