

# Jan Harold Mercado Alcantara

Academia Sinica, Taipei, Taiwan

✉ jan.harold.alcantara@gmail.com

🌐 jhalcantara.github.io

## Research Interests

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Nonlinear Optimization, Feasibility Problems, Variational Inequalities

## Education

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### Doctor of Philosophy in Mathematics

02/2018 - 06/2020

National Taiwan Normal University

Dissertation: Dynamical Systems Approach to Complementarity Problems

Advisor: Prof. Jein-Shan Chen

### Master of Science in Mathematics

05/2013 - 04/2015

De La Salle University

### Bachelor of Secondary Education major in Mathematics

05/2009 - 09/2012

De La Salle University

## Academic Experience

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### Postdoctoral Scholar

08/2021 - present

Institute of Statistical Science, Academia Sinica

Supervisor: Dr. Ching-pei Lee

### Visiting Scholar

08/2022 - 10/2022

Department of Mathematics, National University of Singapore

Host collaborator: Prof. Kim-Chuan Toh

### Postdoctoral Fellow

08/2020 - 07/2021

Department of Mathematics, National Taiwan Normal University

Supervisor: Prof. Jein-Shan Chen

## Teaching Experience

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### Teaching Assistant (Advanced Linear Algebra)

09/2019 - 01/2020

Department of Mathematics, National Taiwan Normal University

Instructor: Prof. Chu-Chin Hu

### Assistant Professor

01/2017 - 12/2017

Mathematics and Statistics Department, De La Salle University

### Teaching Associate

01/2016 - 12/2016

Mathematics and Statistics Department, De La Salle University

### Lecturer

08/2015 - 12/2015

Mathematics and Statistics Department, De La Salle University

### Lecturer

06/2015 - 10/2015

Mathematics Department, Adamson University

11/2012 - 03/2013

## • Courses taught

*Graduate courses:* Linear Algebra and Calculus

*Undergraduate courses:* Abstract Algebra, Differential Equations, Differential Calculus, Integral Calculus, Multivariable Calculus, Differential Equations, Algebra and Trigonometry

## Publications

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### Articles

1. **Alcantara, Jan Harold** and Lee, Ching-pei, "Accelerated projected gradient algorithms for sparsity constrained optimization problems", accepted in *Advances in Neural Information Processing Systems (NeurIPS)* (2022).
2. **Alcantara, Jan Harold**, Chen, Jein-Shan, and Tam, Matthew K., "Method of alternating projections for the general absolute value equation", to appear in *Journal of Fixed Point Theory and Applications* (2022).
3. **Alcantara, Jan Harold** and Chen, Jein-Shan, "A new class of neural networks for NCPs using smooth perturbations of the natural residual function", *Journal of Computational and Applied Mathematics*, vol. 407, 114092 (2022).
4. Sun, Juhe, Fu, Weichen, **Alcantara, Jan Harold**, and Chen, Jein-Shan, "A neural network based on the metric projector for solving SOCCVI problem", *IEEE Transactions on Neural Networks and Learning Systems*, vol. 32, no. 7, pp. 2886–2900 (2021).
5. Wu, Caiying, Wang, Jing, **Alcantara, Jan Harold**, and Chen, Jein-Shan, "Smoothing strategy along with conjugate gradient algorithm for signal reconstruction", *Journal of Scientific Computing*, vol. 87, no. 1, Article 21 (2021).
6. **Alcantara, Jan Harold** and Chen, Jein-Shan, "A novel generalization of the natural residual function and a neural network approach for the NCP", *Neurocomputing*, vol. 413, pp. 368–382 (2020).
7. **Alcantara, Jan Harold**, Lee, Chen-Han, Nguyen, Chieu Thanh, Chang, Yu-Lin, and Chen, Jein-Shan, "On construction of new NCP functions", *Operations Research Letters*, vol. 48, pp. 115–121 (2020).
8. **Alcantara, Jan Harold** and Chen, Jein-Shan, "Neural networks based on three classes of NCP-functions for solving nonlinear complementarity problems", *Neurocomputing*, vol. 359, pp. 102–113 (2019).
9. **Alcantara, Jan Harold**, Lao, Angelyn, and Ruivivar, Leonor, "Stability analysis of the ODE model representation of amyloidogenic processing in Alzheimer's disease in the presence of SORLA", *Molecular BioSystems*, vol. 12, pp. 1468–1477 (2016).

### Preprints

10. **Alcantara, Jan Harold** and Lee, Ching-pei, "Global convergence and acceleration of fixed point iterations of union upper semicontinuous operators: proximal algorithms, alternating and averaged nonconvex projections, and linear complementarity problems", arXiv:2202.10052, submitted to *Mathematics of Operations Research* (2022).
11. Nguyen, Chieu Thanh, **Alcantara, Jan Harold**, Okuno, Takayuki, Takeda, Akiko, and Chen, Jein-Shan, "Unified smoothing approach for best hyperparameter selection problem using a bilevel optimization strategy", arXiv:2110.12630, under major revisions for *Mathematical Programming* (2021).

## In Preparation

12. Nguyen, Chieu Thanh, **Alcantara, Jan Harold**, Lu, Yue, and Chen, Jein-Shan, "Smoothing penalty method for second-order cone programming".
13. Nguyen, Chieu Thanh, Hao, Zijun, **Alcantara, Jan Harold**, and Chen, Jein-Shan, "A p-power penalty approach for solving second-order cone complementarity problems".
14. Nguyen, Chieu Thanh, Santos, Bernadette Louise, **Alcantara, Jan Harold**, and Chen, Jein-Shan, "Smoothing functions for nonsmooth regularizers".
15. Miao, Xin-He, **Alcantara, Jan Harold**, and Chen, Jein-Shan, "A Gauss-Seidel type method for solving  $\ell_2 - \ell_p$  minimization".
16. **Alcantara, Jan Harold** and Chen, Jein-Shan, "An efficient and accurate solver for large-scale sparse recovery problems using a conjugate gradient algorithm for a class of smooth nonconvex regularizers".

## Conference Talks

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- "Method of alternating projections for solving absolute value equations", Contributed talk at the International Conference on Continuous Optimization, Pennsylvania, USA, July 2022.
- "Proximal algorithms for a class of nonconvex nonsmooth minimization problems involving piecewise smooth and min-weakly-convex functions", Invited Speaker for the Special Session of 2021 Taiwan Mathematical Society Annual Meeting, Taipei, Taiwan, January 2022.
- "Neural networks based on three classes of NCP-functions for solving nonlinear complementarity problems", Oral presentation delivered at Taiwan Mathematical Society Annual Meeting, Taipei, Taiwan, December 2018.
- "The dynamics of a breast cancer model with Raphanus sativus extract", Oral presentation delivered at the 2017 Mathematical Society of the Philippines Annual Convention, Legazpi City, Philippines, May 2017.
- "The dynamics of SORLA's influence on amyloidogenic processing", Oral presentation delivered at the 2016 Mathematical Society of the Philippines Annual Convention, Cebu City, Philippines, May 2016.
- "Stability Analysis of the ODE Model Representation of Amyloidogenic Processing in Alzheimer's Disease in the presence of SORLA", Oral presentation delivered at the 3rd Asian Regional Conference on Systems Biology (ARCSB2015-TriSys), Selangor, Malaysia, September 2015.

## Invited Talks

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- "Hyperparameter learning and sparse optimization: Theory and algorithms", Seminar (Online), RIKEN Center for Advanced Intelligence Project, Tokyo, Japan, October 2022.
- "Smooth nonconvex regularizers for sparse recovery problems and an efficient conjugate gradient algorithm", 2020 National Center for Theoretical Sciences Optimization Day for Young Researchers, National Taiwan Normal University, Taipei, Taiwan, December 2020.
- "Smoothed neural networks for nonlinear complementarity problems", Workshop on Advances in Continuous Optimization, University of Tokyo, Tokyo, Japan, September 2019.

## Invited Lectures

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- “Projection methods for feasibility problems”, DLSU Mathematics and Statistics Lecture Series, De La Salle University, Manila, Philippines, August 2021.
- “Qualitative Analysis of Solutions and Introduction to Bifurcation”, DLSU Mathematics Lecture Series, Manila, Philippines, 2017.
- “On Stability and Bifurcation Analysis”, First Lecture Series for AY2016-2017, Mathematical Society of the Philippines – National Capital Region held at Mapua Institute of Technology 2016.
- “Mathematical Modelling of Dynamical Systems: Stability Analysis of ODE Models”, DLSU Mathematics Lecture Series, Manila, Philippines, 2016.

## Grants and Awards

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- Travel Grant for Young Scholars Attending International Conferences Abroad, 2022, Academia Sinica
- Department of Science and Technology – Accelerated Science and Technology Human Resource Development Program (DOST-ASTHRDP) Scholarship 2013-2015 awarded by Department of Science and Technology – Science Education Institute.
- St. La Salle Scholarship 2009-2012 awarded by De La Salle University.

## Professional Service

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Reviewer:

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| ○ Journal of Applied Mathematics and Computing | ○ Neural Computing and Applications |
| ○ Journal of Computational and Applied Math    | ○ Pacific Journal of Optimization   |
| ○ Journal of Global Optimization               | ○ Taiwanese Journal of Mathematics  |

## References

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### **Jein-Shan Chen, Ph.D.**

Professor and Dean  
Department of Mathematics  
College of Science  
National Taiwan Normal University  
jschen@math.ntnu.edu.tw

### **Ching-pei Lee, Ph.D.**

Assistant Research Fellow  
Institute of Statistical Science  
Academia Sinica  
chingpei@stat.sinica.edu.tw

### **Akiko Takeda, D.Sc.**

Professor  
Department of Creative Informatics  
Department of Mathematical Informatics  
The University of Tokyo  
takeda@mist.i.u-tokyo.ac.jp

### **Yu-Lin Chang, Ph.D.**

Professor  
Department of Mathematics  
National Taiwan Normal University  
ylchang@math.ntnu.edu.tw