

LSU Control and Optimization Zoom Seminar

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Variational Stability of Alternating Projections

Abstract: The alternate projection method is a classical approach to dealing with the convex feasibility problem. We first show that given two nonempty closed convex sets A and B , consecutive projections $x_{n+1} = P_B(P_A(x_n))$, $n \geq 1$, produce a self-contacted sequence, providing an alternative way to establish convergence in the finite dimensional case [2]. In infinite dimensions, a regularity condition is required to ensure convergence of the sequence $\{x_n\}$ [4]. In [3], it was established that a regularity condition from [1] also ensures the variational stability of the above method. In this talk, we complete this result and show that variational stability is equivalent to the aforementioned regularity assumption.

References:

- [1] H. Bauschke and J. Borwein, [On the convergence of von Neumann's alternating projection algorithm for two sets](#), *Set-Valued Analysis* 1 (1993), 185–212.
- [2] A. Böhm and A. Daniilidis, [Ubiquitous algorithms in convex optimization generate self-contracted sequences](#), *Journal of Convex Analysis* 29 (2022) 119–128.
- [3] C. De Bernardi and E. Miglierina, [A variational approach to the alternating projections method](#), *Journal of Global Optimization* 81 (2021), 323–350.
- [4] H. Hundal, [An alternating projection that does not converge in norm](#), *Nonlinear Analysis: Theory, Methods, and Applications* 57 (2004), 35–61.

Biography: Prof. Daniilidis received his PhD from the University of the Aegean in Greece in 1997, and his Habilitation Degree from University of Pau in France in 2002. After several post-doctoral and assistant professor appointments in France and in Spain, he became a tenured associate professor at the Autonomous University of Barcelona in 2007. In 2013, he became a full professor in the Department of Mathematical Engineering at the University of Chile, where he was the Deputy Director of the Center for Mathematical Modelling. Since 2021, he has been a full professor at TU Wien, where he serves as head of the Research Unit of Variational Analysis, Dynamics and Operations Research. He has 80 entries in MathSciNet and is a member of the editorial boards of *Journal of Mathematical Analysis and Applications*, *Journal of Optimization Theory and Applications*, and *SIAM Journal on Optimization*.