



## CIRRELT Seminar

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### AIRCRAFT LANDING PLANNING UNDER UNCERTAINTIES

**Abstract:** Aircraft Landing Planning is challenging because the inherently limited capacity of airport runways causes bottlenecks. This type of planning involves different stakeholders (e.g., airlines, air traffic services providers, airport authorities, and passengers) and faces various uncertainties (e.g., take-off time variability or wind speeds). This study, conducted in collaboration with the European Organization for the Safety of Air Navigation (EUROCONTROL), proposes a mathematical formulation of the problem and a simulation framework that accounts for uncertainties. We also propose different solution methods: a descent and a tabu search, as well as a mechanism for guiding restarts, to diversify the search process. These methods provide, in our simulated environment, more effective and stable solutions than the popular firstcome-first-served practice regarding three objective functions (namely, delay, fuel, and landing sequence stability), which are considered lexicographically. Indeed, the average delays and fuel costs are reduced by 50% and 10%, respectively, at the cost of a small number of landing-sequence modifications, as each flight is repositioned an average of 0.5 times. Moreover, the computations can be performed quickly, which is crucial because re-optimization needs to be done online when flight information is updated.

**About the speaker:** Nicolas Zufferey is a full professor of operations management at the University of Geneva in Switzerland, since 2008. His research activity focuses on designing solution methods for difficult and large optimization problems, with applications mainly in transportation, scheduling, production, inventory management, network design, supply chain management and telecommunications. He is member of the CIRRELT transportation and logistics research center ([www.cirrelt.ca](http://www.cirrelt.ca)) and of the GERAD decision-analysis research center ([www.gerad.ca](http://www.gerad.ca)). He received his BSc and MSc degrees in Mathematics at EPFL (Swiss Federal Institute of Technology at Lausanne), as well as his PhD degree in operations research (2002). He was then successively a post-doctoral trainee at the University of Calgary (2003 – 2004) and an assistant professor at Laval University (2004 – 2007). He is the (co)author of more than 130 publications (papers in professional journals, proceedings of conferences, and book chapters) and has reviewed papers for 51 international journals. With 71 coauthors, he has had research activities with 32 Universities (mainly in Europe and America), as well as with 25 private companies.

MERCREDI / WEDNESDAY

3 août 2022 / August 3rd, 2022

10h30

Salle / Room 5441

Pavillon André-Aisenstadt

Université de Montréal

Ouvert à tous / Open to all

Organisateur / Organizer  
Jean-Yves Potvin