# Accepted Manuscript


A robust optimization approach for airport departure metering under uncertain taxi-out time predictions

Mayara Condé Rocha Murça

PII: S1270-9638(17)30885-4
DOI: http://dx.doi.org/10.1016/j.ast.2017.05.020
Reference: AESCTE 4033

To appear in: *Aerospace Science and Technology*

Received date: 20 February 2016
Revised date: 18 April 2017
Accepted date: 12 May 2017

Please cite this article in press as: M.C.R. Murça, A robust optimization approach for airport departure metering under uncertain taxi-out time predictions, *Aerosp. Sci. Technol.* (2017), http://dx.doi.org/10.1016/j.ast.2017.05.020

# A ROBUST OPTIMIZATION APPROACH FOR AIRPORT DEPARTURE METERING UNDER UNCERTAIN TAXI-OUT TIME PREDICTIONS

***Mayara Condé Rocha Murça**[Aeronautics Institute of Technology, ITA]
Pça Mal. Eduardo Gomes, 50, Vila das Acácias, 12228-900, São José dos Campos, SP, Brazil
E-mail: mayara@ita.br

*Corresponding author

## ABSTRACT

Airports are critical elements in the air transportation system in terms of traffic flow management. The high volume of operations along with the constraining airside capacity can exacerbate surface congestion and lead to increased flight delays and costs, especially during peak times. Surface traffic optimization is an alternative for alleviating congestion. However, the high level of uncertainty in actual operations can compromise the effectiveness of optimal policies. This paper presents a robust optimization approach for metering aircraft departures under uncertainty in the taxi-out process. A mixed integer linear programming model for runway sequencing and scheduling that incorporates uncertainty sets for the taxi-out time is proposed in order to dynamically determine an optimal and robust sequence and schedule of aircraft release from the gate. Actual operational data from Brasilia International Airport in Brazil is used to evaluate the effectiveness of departure metering at this airport. An assessment of benefits and trade-offs of introducing robustness is performed based on stochastic simulation of departure performance under different control strategies. The robust optimization approach shows positive impacts in protecting against uncertainty as it reduces runway delays and taxi-out times and increases takeoff time predictability.

Keywords: air traffic flow management; air traffic control; departure metering; robust optimization.