
The tail routing problem in air transportation

Manuel Fuentes^{*†1}, Luis Cadarso^{‡1}, Vikrant Vaze², and Cynthia Barnhart³

¹Universidad Rey Juan Carlos [Madrid] (URJC) – Calle Tulipán s/n. 28933 Móstoles. Madrid, Spain

²Dartmouth College – United States

³Massachusetts Institute of Technology (MIT) – 77 Massachusetts Ave, Cambridge, MA 02139, United States

Abstract

Airline planning is a field rich in combinatorial optimization problems. Flights and airports make up the network where aircraft and passengers fly. In order to schedule aircraft, assignments of fleet types to flights and of aircraft to routes must be determined. The former is known as the fleet assignment problem while the later is known as the aircraft routing problem in the literature. Aircraft routing is usually addressed as a feasibility problem whose solution is needed for constructing crew schedules. Note that all these problems are usually solved from 4 to 6 months before the day of operations. Therefore, there is limited information regarding each aircraft's operational condition.

The tail routing problem, which has received limited attention in air transportation literature, is solved when additional information regarding operational conditions is revealed aiming at determining each aircraft's route for the day of operations accounting for the originally planned aircraft routes and crew schedules. Therefore, it is a problem to be solved the day before operations.

We propose a mathematical programming approach based on sequencing that captures all operational constraints and maintenance requisites while operational costs are minimized and schedule changes with respect to original plans are minimized.

Computational experiments are based on realistic cases drawn from a Spanish airline, which features a network with more than 1000 flights and more than 100 aircraft.

Keywords: Air transportation, tail assignment, aircraft routing

*Speaker

†Corresponding author: manuel.fuentes@urjc.es

‡Corresponding author: luis.cadarso@urjc.es