

Assignment 5: Air Transportation Systems Analysis

Date Due: October 29, 2018

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Problem 1

To do this problem, use the New Generation, Long-Range Transport (Boeing 787-800 class) from the web site (http://128.173.204.63/courses/cee5614/cee5614_pub/boeing787_class.m). An airline submits a flight plan from San Juan, Puerto Rico (TJSJ) to Lisbon International Airport (LIS) using the following flight plan.

TJSJ ODUCA VSM LIS

- Use skyvector.com to estimate the total distance traveled by this flight. Report that distance in your answer and for planning. Include a graphic of the proposed route in the flight plan.
- How far in advance is the flight plan expected to be filed with the Air Navigation Service provider?
- Use the `unrestrictedClimbAnalysis.m` Matlab script to estimate the mass of the aircraft at the Top of Climb (TOC) point if the flight plan files an initial altitude of 37,000 feet. The aircraft takeoff weight is 205,000 kg. with 65,000 kg of fuel. Use the default climb speed profile provided in the aircraft data file. Use **ISA+20** atmospheric conditions in your climb calculations.
- Use the `unrestrictedDescendAnalysis.m` Matlab script to estimate the fuel used from the Top of Descent (TOD) point to the destination airport. For an initial iteration assume the aircraft starts its descent from 39,000 feet to LIS. Estimate the descent distance (assume ISA conditions for the descent).
- Estimate the fuel used in cruise for this flight if the airline operations center flies Mach 0.83 for the cruise speed. Assume the cruise altitude changes once from 37,000 to 39,000 feet at a point 2,000 nm from the origin airport.
- How much is the total fuel used in the complete flight?

Problem 2

This is a continuation of Problem 1.

- If the aircraft has an **engine failure at a point 2,000 nm** from the TOC point, estimate the best altitude and Mach number to divert to an alternative airport. Explain your selection.
- Identify two feasible airports that can be used as diversion airports (other than the departure airport).
- Can the aircraft continue to Lisbon after the engine failure? Explain.

Problem 3

Read the article (https://en.wikipedia.org/wiki/Future_Air_Navigation_System) and answer the following:

- Briefly explain what are the components of FANS 1/A.
- How can FANS 1/A help airlines and air traffic controllers?
- Explain the differences between positive and procedural air traffic control.

Problem 4

Use Google Earth or Google Maps to answer the following questions:

a) Can Chicago O'Hare International Airport (ORD) conduct triple approaches in bad weather conditions?

Name three possible runways that can be used for that purpose. Support your answer looking at Flightaware traffic.

b) Los Angeles Airport normally handles arrivals on runways 25L and 24R. Estimate the separation between the runways and explain the rule used to establish the separation for simultaneous arrivals according to the FAA.