Assignment 2: Simple Runway Length Calculations

Date Due: February 4, 2016 Instructor: A. A. Trani

Problem 1

The Kit Carson County Airport (ITR) near Burlington in the State of Colorado is planning a new master plan. The airport serves general aviation (i.e., piston-powered) aircraft and would like to serve corporate jets such as the Falcon 900 (shown in Figure 1).

a) For the master plan, estimate a suitable runway length to operate all aircraft safely at the airport. If a runway extension is needed, make a recommendation.

b) Verify if the smaller GA aircraft require more runway than the the corporate jets.

c) If this airport had been located at sea level under (ISA + 30 deg. F) conditions, what would be the runway length needed?

Figure 1. Falcon 900 Aircraft Departing San Jose International Airport (A.A. Trani)

Problem 2

a) Use the fundamental equation of motion included in the class notes, to explain the effect of aircraft mass on runway length requirements.

b) An aircraft has a stalling speed of 96 knots at sea level conditions in the landing flap configuration. What is the typical approach speed of this aircraft according to US regulations.

c) For the aircraft in part (b) estimate the approach speed in la Paz Bolivia located 13,325 feet above sea level. Assume all other conditions are the same.

Problem 3

Using the World airport database linked in our web site (http://worldaerodata.com), collect data about the longest runway length and airfield elevation for the following international airports: Shanghai International Airport (PVG), Toluca International (TLC) and Montreal (YUL).

a) Plot the longest runway length vs airfield elevation. Is there a trend in terms of runway length vs. airfield elevation? Comment.

b) Why would an airport like New York Kennedy must have one very long runway (like runway 31L)? Answer the question by looking at the Boeing or Airbus documents for Boeing 747-400 or Airbus A380 including the takeoff performance charts.

Problem 4

A new airport is to be constructed in Washington State. The airport authority would like to request your services to estimate the runway length requirements to support regular operations using the aircraft shown in Table 1. The new airport is to be located at 3,150 feet above sea level conditions. Use the maximum temperature of the hottest month as 85 deg. oF.

Table 1. Aircraft for Airport in Problem 1.

Aircraft	Engine	Remarks
Boeing 717-200 121,000 MTOW Passenger aircraft	BMW/Rolls-Royce BR715 high-bypass-ratio engines.	To be used in routes of up to 1,750 nm to the US West Coast

a) Find the runway length needed to operate the aircraft. Use standard two-class cabin configurations stated in the Boeing APM documents (when applicable).

b) Can the aircraft carry some cargo in the 1,750 nm flight above the passenger load? Explain.