The AAE Spring 2011 Colloquium Series

Generalized Cost Optimization of Short-Haul Twin-Turboprop aircraft including Airport considerations

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ARMS 1109

Abstract:
Travelers on short haul routes demonstrate some very interesting trade-offs. Most passengers tend to prefer the mode that offers them the lowest Generalized Cost of travel (GCT), which represents the sum total of all the direct and indirect costs incurred.

This talk will discuss a methodology for conceptual design and optimisation of twin-turboprop aircraft for short-haul business travel. GCT is considered to be the summation of costs related to the access to and from the airport (Access Cost), provision of the flight services (Flight Cost), money value of the total travel time (Time Cost), and costs associated with setting up and operating the airport (Airport Cost). An aircraft conceptual design and optimization problem is posed in terms of 17 design variables and nine constraints. The methodology obtains the configuration and flight profile of the aircraft and the associated airport infrastructure that meets the expected level of travel demand at the least possible GCT.

The methodology can also be utilised to carry out a comparative analysis of the GCT of competing Commuter and Regional aircraft, to assess their suitability of operation over a particular route. As a demonstration of the application of this methodology, the results of two case studies for short-haul business air-travel in India are presented. These case studies illustrate the efficacy of this methodology for a systems-engineering based planning and analysis of an air transportation system.

Biography of Speaker:
Dr. Rajkumar S. Pant areas of specialization include Aircraft Conceptual Design, Air Transportation, and Optimization. He has been a member of faculty of Aerospace Engineering Department at the Indian Institute of Technology Bombay for around two decades.

Dr. Pant is an alumnus of College of Aeronautics, Cranfield University, UK, where he did his Ph.D. under Commonwealth Scholarship Scheme, and IIT Madras where he did his Masters. He has also worked for five years in Hindustan Aeronautics Limited. Currently, he is a visiting faculty at Department of Aerospace & Ocean Engineering at Virginia Tech on a sabbatical from his parent institute. Earlier, he was a visiting scientist at Imperial College London in 2006 and Cambridge University in 2008.

An informal coffee & cookie reception will be held prior to the lecture at 2:30 p.m. in the AAE/ARMS undergraduate lounge (directly in front of ARMS 3rd floor elevators)