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Visualization of Air Traffic Flow for Modeling and Control Applications

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A safe and efficient aviation industry is vital to the global economy. The growing traffic demand, rise in oil prices, delays in building new runways and security issues are imposing pressures on the system to evolve from the current procedure-based human-centered system to a more flexible system with higher levels of automation. Air Traffic Management (ATM) involves several layers of decision-makers scattered between the service providers (Airports and the Federal Aviation Administration in the United States) and users of airspace (Airlines, General Aviation, Cargo Carriers). Several types of uncertainties are pervasive in the system. ATM needs major overhauling in the United States of America and Europe and traffic demand is growing at a rapid rate in Asia. The transformation of ATM requires both policy and technological changes.

The aim of this video is to present the complexity and richness of the problems in Traffic Flow Management and engage the Controls Community to become part of the solution. The video is produced using the Future ATM Concepts Evaluation Tool (FACET), an environment for modeling and evaluating system-wide airspace operations over the United States. The video consists of two parts.
The first part, "A day in the life of air traffic in the U.S.," shows the diurnal nature of air traffic, growth in the early morning, heavy demand during the day and early evening and the decay later in the night. The traffic flow shows highlights like the congested northeastern part of United States, forbidden regions for air traffic and general traffic patterns. The second part of the video shows the effect of controls to mitigate the effects of severe weather on traffic flow patterns. The visualization shows traffic in holding patterns due to lack of arrival capacity at New York region airports, traffic avoiding severe weather and the unfolding interaction between demand and capacity. The video has been a highly effective tool to educate specialists and laymen about the air traffic control problem.

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