

1. Dynamic reconfiguration of terminal airspace during convective weather: Robust optimization and conditional value-at-risk approaches

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Abstract: This paper presents robust optimization and Conditional Value-at-Risk (CVaR) approaches to mitigate the effect of weather forecast uncertainty by dynamically reconfiguring the terminal airspace. For busy airports, a terminal area is highly affected by a large volume of aircraft flying through narrow portion of space in a short period of time, and thus the terminal area is very sensitive to disruptions especially from convective weather. The inherent uncertainty of the weather forecast may create more delays and widespread disruptions in the capacity-limited airspace system. Accordingly, the objective of this research is to identify new and robust airspace structures that can cope with different levels of weather forecast uncertainty. In this research, robust optimization and CVaR approaches are proposed to find new terminal airspace routes that have a high average probability to be open and, at the same time, are robust to uncertainty during convective weather. A numerical study is conducted and the results show that the proposed approaches effectively identify robust airspace configurations, as the trade-off between optimality and conservatism is controllable. © 2019 (37 refs)

Main heading: Weather forecasting

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