Department of Mechanics, Informatics and Aerospace
Jesús Gonzalo de Grado (jesus.gonzalo@unileon.es) | Head of Aerospace Engineering Area

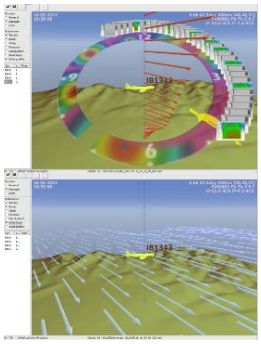
universidad de león

aerospace engineering area

2012 research highlights

Meteorological Models for Air Traffic Automation

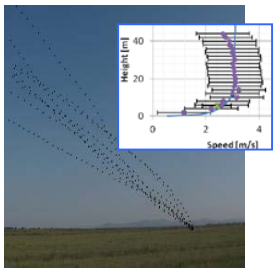
High precision dedicated meteorological models



Customised 4D weather forecast models to deliver digital meteorological data with sufficient resolution and accuracy for autonomous air traffic management. This is normally based on multi-weather-model multi-analysis ensemble prediction systems with real time assimilation of external data. Currently, the research focuses on:

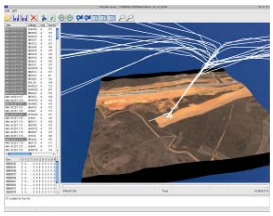
- Coupling of mesoscale models with detailed CFD (see below)
- Management and propagation of uncertainties throughout the process
- Forecast delivery and configuration control over the network

Lighter-than-air bubble tracking for real time wind profile measurements



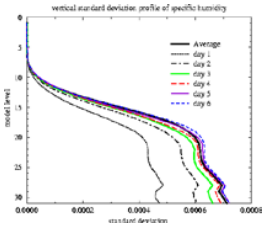
This low cost non-intrusive method allows the assessment of the real wind conditions in the airfield both visually and computationally by tracking helium filled bubbles along their ascending path. The system can remotely track bubble clusters up to 300 m height, reaching very good accuracy after filtering the readouts from several cameras. This is an interesting solution for researchers in air traffic management or unmanned vehicle operations for the last phase of the mission, were incidents concentrate.

Estimation of wind fields from observed aircraft trajectories



Some of the phases of an aircraft mission are easily predictable. When aircraft trajectory is known, differences between expected and real path can be due to meteorological conditions. Dedicated filters can be used to deduce the wind field from large dataset of real trajectories. The method is completed with meteorological models to obtain better initial estimations and with real time measurements to improve accuracy.

Coupling of Meteorological and CFD models



The coupling of mesoscale and CFD model capabilities allows to obtain a more accurate and powerful tool for wind knowledge and forecasting. CFD is able to model the details of flow around specific geographic and man-made features; mesoscale models incorporate information about the outer scale geophysical variability (evolving boundary conditions and assimilation of external data).
A model based on boundary conditions provided by a mesoscale model and fine-scale topographic features modelled in CFD is currently under development.

Escuela de Ingenierías v Campus de Vegazana, s/n v 24071 León v Spain v Tel.: (+34) 987 291 000 Ext. 5251 v Fax: (+34) 987 291 614
http://uleia.unileon.es v jesus.gonzalo@unileon.es