

Regular Graph based Free-Route Flight Planning Approach

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Highlights:

- Regular graph with locally connected nodes can constitute a free route airspace model
- Graph attributes can effectively model static and dynamic airspace elements
- Adequate election of algorithms can produce shortest flight route according to defined constraints
- Preliminary software tool illustrating the proposed flight planning approach is available

Keywords:

Free Route Airspace, Flight Route Planning, Graph Theory, Airspace Modelling

Abstract:

Free route airspace concept assumes that “users can freely plan a route between a defined entry point and a defined exit point, with the possibility of routeing via intermediate (published or unpublished) waypoints, without reference to the air traffic services route network”¹. This implies a need of an airspace mathematical model enabling effective flight planning. The airspace model ought to include legacy data, such as restrictions and restricted areas to preserve the major airspace features. Simultaneously, it may include currently available data sets such as winds, clouds, storms predictions as well as an airspace complexity to extensively support the flight planning process. This work introduces a new graph theory based airspace model dedicated to an automatic free route flight plan preparation. The crucial scope of work concentrates on effective incorporation of all available datasets describing the airspace state into a new coherent model. The model enables standard shortest paths finding algorithms application for the flight plans approximation.

¹ Free Route Airspace definition, <https://www.eurocontrol.int/articles/free-route-airspace>