



AIRCRAFT WAKEFIELD MODELING + AUTOMATING AERODYNAMIC TUNING



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PROBLEM STATEMENTS

Aircraft Wakefield Modeling

Wakefields can invert aircraft in flight, resulting in catastrophe and loss of human life. Aircraft wakefield modeling allows pilots to safely train for flight in proximity to wakefields.

Automatic Aerodynamic Tuning

Ensuring simulation realism requires lengthy manual tuning. Automating aerodynamic tuning automatically performs this task.

- More accurate
- Faster
- Greater realism
- Greater flight certification rates

METHODS

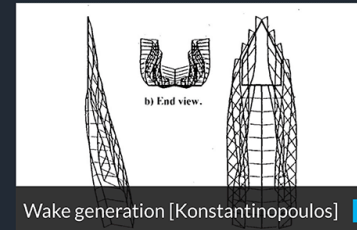
Aircraft Wakefield Modeling

- Complex aerodynamic theory was utilized to simulate aircraft wakefields.
- Original numerical techniques were created to produce highly efficient functions capable of simulating wakefields for spans of time never seen before in similar studies.
- Results fell under 9% error from real flight data.

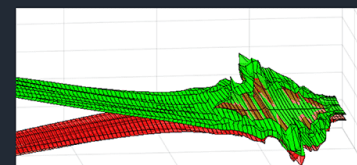
Automatic Aerodynamic Tuning

- Clever numerical and parsing techniques were molded into a sophisticated aerodynamic control system.
- Capable of automatically tuning a virtual aircraft.
- Achieves less than 0.1% error from a desired flight pattern.

A simulator for unsteady wakefields was designed for any aircraft, and an automated aircraft controller was designed to automate aircraft flight.



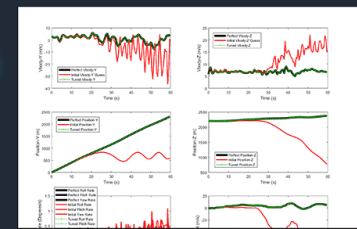
Wake generation [Konstantinopoulos]



Wake propagation for MITO take-off



Controlling virtual flight via Simulink



Near-perfect automated tuning results

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