Noise impact simulation of aircraft flight paths including dynamic engine effects

Aircraft Noise and Climate Effects

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Project Overview

Modeling the aircraft noise impact on communities in airport vicinities requires an as realistic modeling of the aircraft's flight path as possible. Real flight paths can show several fluctuations in the aircraft's trajectory as well as in its engine setting, which are in general not captured by most flight path modeling tools. These assume a quasi-steady state of the engine over relatively large time-steps and any change in the aircraft's state is modeled as a sudden or abrupt change. Dynamic effects such as the time needed to spool up from low to high thrust settings can not only affect values of important noise relevant parameters such as the fan rotation speed and jet speed, but also the proximity of the aircraft to the observer on the ground. A high-fidelity description of the aircraft's flight path can therefore have a significant effect on the simulated noise impact on airport communities.

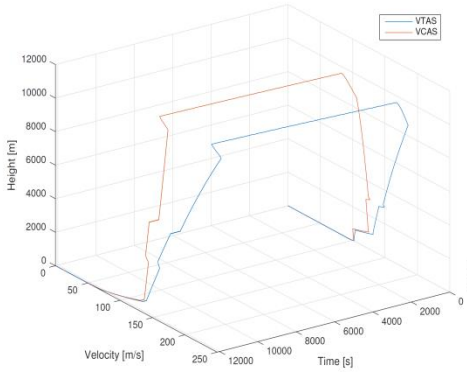
Student profile: Good knowledge in flight mechanics, engine performance modeling and aircraft acoustics

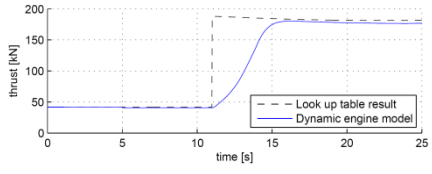
- Good programming skills (Matlab, Simulink, C++)
- Good analytical skills and high level of motivation

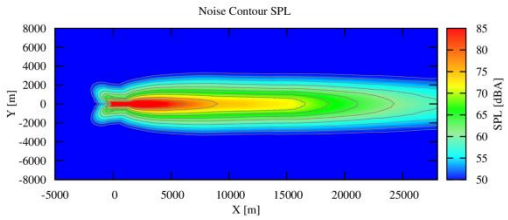
Project Goals

Simulate the community noise impact of detailed takeoff and approach flight paths around a representative airport by including transient engine effects:

- Extend FPP Flight Mechanics Toolbox to produce all noise relevant inputs for a time-resolution of < 0.1 sec
- Extend capability of ANCE aircraft noise simulation tool to model community noise impact of the detailed flight paths including transient engine effects
- Compare noise impact of simpler flight paths that assume steady-state engine state with flight paths that include dynamic effects to analyze possible gains in noise modeling accuracy







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MSc Research Thesis Assignment