Towards Characterising Taxi Operations for Fuel Burn Estimation

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Assessing the climate impact of air transportation has gained higher visibility. Fuel burn estimation is important This paper applies a data-driven and empirical approach. Analysed x airports … what did we find This paper demonstrates the feasibility of applying open ADSB data to augment the fuel burn estimation during the taxi-phase. This work serves as an input to the further development of the gate-to-gate fuel burn estimation by the Performance Review Commission.

Introduction

The contributions of this paper are as follows:

- conceptualisation and refined definition of operational LTO cycle;
- surface trajectory based description of taxi sub-phases; and
- initial use-case analysis of the proposed approach.

Background

ICAO LTO Cycle

ICAO defines LTO Cycle (ICAO 2017).

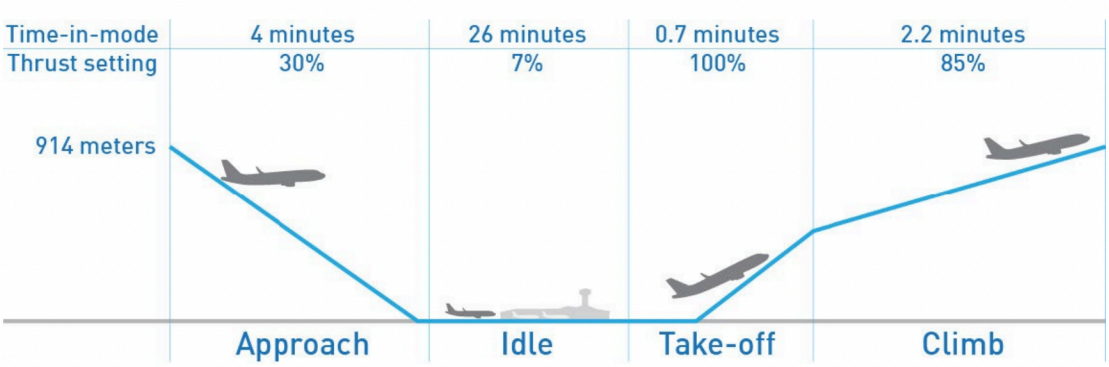

FIGURE 1: ICAO engine emission certification LTO cycle.

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Based on the LTO cycle, the fuel burn of an aircraft is determined by the specific sub-phase, i.e. mode, and its associated thrust setting. The latter can then be expressed as an engine specific fuel-flow rate. In general, the total fuel burn F_i of an aircraft with engine E for flight i is then the sum of the fuel burn per each sub-phase:

$$F_i = \sum_p (f_{ip} * t_{ip})$$

a given taxi phase of a flight is calculated by multiplying the time spent at each phase by a fuel-flow rate of the engine type for the corresponding phase.

Materials, Methods

Results and Discussion

Conclusions

References

ICAO. 2017. "ICAO Annex 16, Volume II, Aircraft Engine Emissions." 4th edition.