Fuel consumption assessment for speed variation concepts during the cruise phase

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Motivation

- Traffic grow
- Imbalance demand-capacity
- New concepts to deal with traffic based on 4D traj.:
  - BDT, SBT, RBT
  - ERASMUS
  - TC-SA
  - ...
- Extra fuel consumption
Presentation Outline

- Threats and Opportunities on speed variation
- Influencing parameters
- Application examples
- Cost Index sensitivity
- Conclusions and future work
Threats and Opportunities on speed var.

- Specific Range

![Graph showing specific range with speed var. parameters such as SR_{max}, SR_0, V_{eq}, V_{MR}, and V_0 with Cl<0, Cl=0, and Cl>0 regions.](image-url)
Influencing parameters
Influencing parameters
Influencing parameters

- CI ORY-NCE

- [Graphs showing the relationship between CI and various parameters]
Application Examples

- FCO-CDG:
  - A320
  - Cl 25
  - FL 380
  - $V_0$ 0.78
Application Examples

- **FCO-CDG:**
  - A320
  - CI 25
  - FL 380
  - $V_0 = 0.78$
Application Examples

- ORY-NCE:
  - A320
  - CI 60
  - FL 390
  - $V_0 \ 0.79$
Application Examples

• ORY-NCE:
  • A320
  • CI 60
  • FL 390
  • $V_0 0.79$
Application Examples

- FCO-CDG
Application Examples

- ORY-NCE
Cost Index sensitivity

- FCO-CDG
Cost Index sensitivity

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Conclusions and Future Work

Assessment analysis effects on cruise speed variations into fuel consumption:

- Speeds variations have direct impact on fuel consumption
- Increase of speed will increase fuel consumption
- Reduction of speed may lead to save or expend more fuel
- The desired CI have a big influence
  - For typical European region flight with typical CI, reductions up to 7% without negative impact on fuel consumption
  - Low values of CI reduce margin of reduction but minimize lost on increment
- Difficult to arise general figure on fuel efficiency valid for all flights
- Alternatives to speed variations have also extra cost. Therefore, speed variations may be competitive, from an economical point of view
Conclusions and Future Work

Future work:
  • Comparison study between ATM solutions
  • Analysis of more flights and different aircraft
Thanks for your attention!
Cost Index sensitivity

- FCO-CDG
Cost Index sensitivity

- FCO-CDG
Cost Index sensitivity

- ORY-NCE