DEPARTMENT FAHRZEUGTECHNIK UND FLUGZEUBAU

Identifying CO_2 Reducing Aircraft Technologies and Estimating their Impact on Global Emissions

Aufgabenstellung zur *Diplomarbeit* gemäß Prüfungsordnung

Background

European aeronautic research is driven by the ambitious goals of the Advisory Council for Aeronautics Research in Europe (ACARE) and its Vision 2020: A 50% reduction in aeronautic-related CO_2 emission in Europe is envisaged for 2020. The International Air Transport Association (IATA) has expanded this goal into a long-term global request for carbon-neutral air traffic by 2050. As a first step a technology roadmap is set up by international experts from industry and academia in a project organized by IATA. Generally speaking there exists a broad range of "technologies" that can be applied to reduce CO_2 emissions. On the one hand CO_2 emissions are influenced by the aircraft configuration and detailed design considerations. On the other hand it is of importance how aircraft are operated in the aviation system.

Task

A comprehensive listing of potential technologies for CO_2 reduction has to be set up and the global impact of the identified new technologies needs to be estimated. This review can be based on literature, the internet, and interviews with experts in the field. These inputs are then taken to estimate the global CO_2 reduction potential of the technologies based on aviation data bases, handbook methods and simple own models.

1. Parametric Assessment:
- Definition of the influencing physical variables which set the fuel consumption and CO_2 production of an aircraft.
- Formulation of an evaluation function suitable to measure the influence of these variables on fuel and CO_2 efficiency.
- Parametric application of the defined target function to assess the impact of each variable with regard to its physical constraints.

2. Technology Survey:
- Identification of current developments and possible future technologies with potential to reduce CO_2 emissions.
- Literature research on the technologies' potential to reduce CO_2 emissions and the timeline to be available for commercial aviation.

3. Fleet Forecast:

- Identification of the current world fleet composition, fuel consumption and CO_2 emissions.
- Estimation of the fuel consumption and CO_2 production of future aircraft equipped with new technology from the technology survey.
- Estimation of the future world fleet composition using generally acknowledged assumptions concerning growth rates, production rates and aircraft utilization cycles.
- Estimation of the future world fleet fuel consumption and CO_2 emissions.

The report has to be written in English based on German or international standards on report writing.

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