

Estimation of CO₂ Emission from Airplane Idling on Airport Ground

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1. INTRODUCTION

One of the main factors of CO₂ emission in Japan is the emission from transportation sector. As for airplane, efforts of the energy saving of airplane are made to reduce CO₂ emissions. However, a little concern about LTO (landing and take off) cycle has been made in Japan. The aim of this work is to estimate the CO₂ emission on the ground (mainly of its idling operation) from the airport design and the flight timetable.

2. ESTIMATION METHOD

The field surveys in the Osaka airport and the simulations using "Airport and Airspace Simulation Model" [1] were carried out to reproduce ground operation and to estimate idling time. A congestion index (unit/h) is defined as four times the summation of the number of airplanes which depart within 15 min before the takeoff of a target airplane and which arrive within 15 min after the departure (leaving apron) of the airplane. The average idling times for 1 and 2 runways are obtained from the simulation in Osaka airport based on the queuing model. Based on the relationships, the amount of environmental pollutant emissions from the other 6 airports were estimated.

3. RESULTS and DISCUSSION

Fig.1 shows the estimated CO₂ emission and the number of departure for each time period in Haneda airport. Although the most congestive period is from 7 to 8, the highest CO₂ amount is exhausted from 12 to 13. The main reason is that the above-defined congestion indices from 12 to 13 are higher than from 7 to 8. In order to reduce the idling time of airplane on the ground, the arrangement of the schedule, that is, minute re-scheduling should be effective to reduce the congestion.

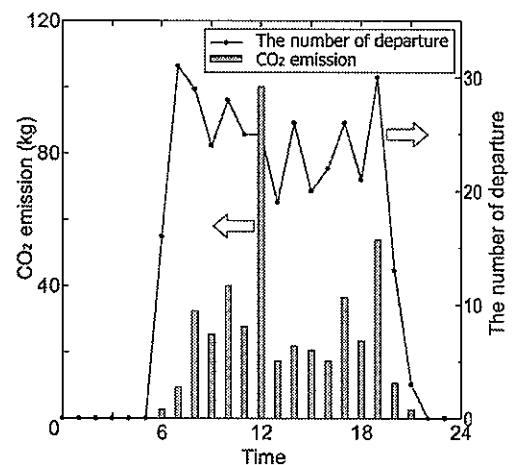


Fig.1 CO₂ emission and the number of departure for each period of time in Haneda airport.

REFERENCE

[1] ATAC : <http://www.atac.com> (31 July 2006)

[2] Aircraft Engine Emissions Home Page :

<http://www.caa.co.uk/default.aspx?categoryid=702&pagetype=90> (31 July 2006)