ABSTRACT

In this work we introduce a mathematical model to improve the aircraft departures planning system. The objective is to maximize the airport performances, minimize delays in the runway operations and to support the air controller work. The followed approach is based on the combination of a one runway two stages algorithm with a multi-runway procedure to find the better departures scheduling. By means of the two stages algorithm, a complex problem dealing with multi-objective functions is split into two interconnected one dimensional problems. In the first stage the aim is to minimize the throughput, defined as the number of aircraft in the time unit, subject to Wake Vortex Separations constraint. An "ad hoc" control heuristic method is used to mix the pre-fixed landing arrivals slots with the departure slots

outgoing from the first stage. In the second stage the class sequence, generated by the first one, is computed in order to minimize the delays between the actual and estimated take-off time of each departing aircraft, subject to fixed CTOTs and ETOTs, and considering some possible departing priority.

Successively a multi-runway procedure is introduced, consisting of an heuristic methodology, which uses the two stage algorithm, to locate as better as possible the aircraft on each available runway. The result is the better feasible take-off sequence in a referred time window. Some simulations on typical flight strips from Milano Malpensa airport in Italy, having two runways, are shown.