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Simulation modeling and fuzzy logic in real-time decision-making of airport services[1]

Decision making by the aircrafts services of the international airport, which provides for intensive traffic of aircraft and their ground handling, becomes a very topical issue. If earlier it was believed that the intensity is provided only by the number of runways, nowadays a large accumulation of aircraft on the airport platform-field creates equally complex difficulties in comparison with aircraft take-offs and landings. Solving such problems with the use of «crisp methods» of queuing theory gives little. This article deals with modern «fuzzy methods» based on simulation modeling and fuzzy logic.

Keywords: simulation, fuzzy algorithm, queuing, priority assignment, fuzzy controller, intelligent computations.

Introduction

Currently, the task of improving operationally accepted decisions at international airports (AP) of Russia is very relevant. In modern AP, functionally interrelated services are used, including:

a) air traffic control service;

b) airfield services at the aerodrome (refueling, preflight maintenance and check of aircraft);

c) meteorological services to the aerodrome;

d) services to ensure the registration, boarding of passengers on a plane and disembarking from an airplane;

e) cargo loading and unloading of aircrafts, and etc.

The most responsible in terms of safety is the air traffic control service, which must be able to select the necessary information from a large volume of messages, and also have the possibility of additional spatial simulation, which allows correctly representing the air position of the airplanes in space and predict their position after a certain time during the flight. However, this service cannot fully perform its functions without coordinating interaction with other functional services. Therefore, the staff is provided with decision support systems (DSS), including those working in online mode, as well as computer training apparatus and corresponding software [1].

Fuzzy logic in conclusions formation based on data of simulation experiments

Simulation modeling is applied when [2]:

a) either statistical data for decision-making is not enough;

b) or such data can't be obtained, and the «natural» experiment is impossible.