

Modeling and Simulations of Crew Redirection During Emergency Evacuations

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Rutgers, the State University of New Jersey has studied many cases with the Federal Aviation Administration (FAA) Civil Aerospace Medical Institute (CAMI) since 2003 and thereby developed an airplane evacuation simulation. Through our study, we found that the major delay of evacuation is because of heavy congestion in the mid-exit area. In the exam of egress flow, the passengers showed the tendency of heading to the closest exits. These tendencies increase congestion in mid exits, while other exits are not fully utilize. Therefore, the key to a more efficient evacuation will be reducing mid-section congestion, and fully utilizing all available exits during evacuations.

To reduce the congestions of the mid cabin exit area, the crew redirection algorithm can be applied. In real cases, crew members of the airplane are well trained for evacuation situations. Crew members can redirect passengers to the proper exits. This crew redirection can help to reduce the congestions and will decrease total evacuation time. The conceptual nature of the crew redirections are implemented into the airplane evacuation simulation. In the crew redirection algorithm, two main factors are applied, redirecting passengers in an entire section, and redirecting passengers at the intersection connected to exits. Two typical double aisle airplanes are used to simulate the effectiveness of the crew redirection algorithm. Through this study, the more efficient crew redirection way can be presented depending on the available exits. Moreover, the results can be used to develop an evacuation manual.