Investigating the Viability of a Deployable Parachute System with Aerial Detachment of the Cabin for Impending Commercial Airplane Crashes via a Novel Computer Simulation

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The goal of this project is to investigate the efficacy of a parachute system in combination with the aerial detachment of the airplane's cabin to prevent an impending airplane crash. Toward this goal, differential equations involving the motion for a cabin falling under parachutes were solved using numerical routines in MATLAB. Amidst the realization of an impending crash and the moment of impact, airplanes allow a considerable period of time where pilots are aware of a potential accident, unlike most vehicle casualties. To take advantage of this opportunity, in the event of an impending crash, the cabin (upper half of fuselage) would detach midair and deploy a system of parachutes to safely land the airplane at competent terminal velocity while the other components that may largely affect the weight and obstinate trajectories would be collectively jettisoned. This idea expanded upon the potentially universal concept of detachable cabins that have been investigated to speed up boarding time for logistics reasons, patented by Airbus. Parachute specifications were adopted from NASA's return capsules. Analyses of the trajectories, velocities, acceleration (effects on passenger health), drag coefficients, parachute sizes necessary for a range of Airbus passenger-planes and deployment conditions (atmospheric conditions, altitude, and current airplane velocities) were conducted given target terminal velocities. Testing proves the viability of the deployable parachute system in combination with the detachment of the cabin to be feasible due to safe accelerations, reasonable parachute sizes, achieved target terminal velocity, and for potentially being economically feasible.

Awards Won: