Abstract “A solution for Airborne release and recapture of small fixed-wing aircrafts on mars”

Small fixed-wing aircrafts hold great potential in analyzing new regions of Mars, allowing a great dive into the topographical complexities of the planet. To help facilitate the process of fixed wing exploration on Mars, this document presents two potential solutions: Perching and the Brodie System.

The perching method utilizes the aerodynamic forces as an aid for landing the small winged aircraft to a specific point. This method is broken into three sections. The first is a “cruise” section with slightly increasing angle of attack. Next, the “pitch up” section increases the angle of attack at a greater magnitude. Lastly, the “dynamic stall” region pushes the aircraft to the max until reaching a stall point. By conducting flight tests performing this maneuver, data from the experiments (i.e airspeed, ground speed, vertical velocity, etc.) can be modeled to create a resulting coefficient of lift versus angle of attack chart. This chart will show the results from the perching maneuver, including the effect of dynamic stall. With this information, the results can be parameterized to fit the aerodynamic conditions present on Mars. From analyzing this data, a feasibility study is necessary to understand the practicality and likelihood of future success when implemented in a real-life scenario.

The Brodie System is a mechanical approach to the issue of recovery for the small fixed-wing aircraft.