

Physics of Paragliding

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Paragliding is a relatively young adventure sport, introduced in the early 1980s, that involves flying lightweight, free-flying, foot-launched glider aircraft without a rigid primary structure. This design inherently leads to instability, particularly during unsteady phases of flight.

This study investigates the stability and dynamics of paragliders during spiral descent, a manoeuvre associated with significant safety risks. Spiral descent is characterized by the helical trajectory of both the pilot and the wing around a shared axis. The manoeuvre poses unique dangers, as, even without brake input, the pilot can remain trapped in a continuous spiral, descending at approximately 20 m/s. In this configuration, pilots are subjected to strong centrifugal accelerations, which can lead to disorientation or even loss of consciousness. This research explores the aerodynamic forces and their interaction with centrifugal and gravitational effects during spiral descent. The curved geometry of the paraglider wing generates complex aerodynamic forces and moments that significantly influence the system's dynamic behaviour. The study highlights the key factors that govern spiral descent dynamics.

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