FOUNDATIONS OF FLIGHT
FLIGHT DYNAMICS–ATTITUDE

AXIS Flight School®

Brought to you by Niklas Daniel and Brianne Thompson of AXIS Flight School at Skydive Arizona in Eloy. Images by Bruce Fournier and Niklas Daniel.

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This installment focuses on defining a common and precise language for describing movements in the air, which is of great benefit, especially during debriefs and when describing events.

Establishing a Reference Framework

A parachute system, for these purposes, is a canopy pilot hanging under a fully inflated canopy. Its center of mass is located just above the canopy pilot's head. Attitude describes the system's orientation relative to the horizon.

Through the center of mass, imagine three axes that are mutually perpendicular to one another:

- Longitudinal (forward and backward)
- Vertical (up and down)
- Lateral (left and right)

Any movement in a straight line along one these axes is called translation. Any angular (turning) movement about the same axes is called rotation:

- Yaw is a rotation about the vertical axis, causing the nose of the canopy to turn left or right.
- Pitch is a rotation about the lateral axis, causing the nose to move up or down.
- Roll (aka "banking") is a rotation about the longitudinal axis, causing one wingtip to move up and one to move down.

The three axes described above move with the parachute system and rotate relative to the earth along with the system. Rotations are produced by torques about the three axes by means of altering the shape of the parachute fabric. Each shape change creates a new flight configuration that varies the distribution of the aerodynamic forces about the system's center of mass. Canopy pilots alter the configuration of their wings by manipulating the brake lines (toggles), rear risers or front risers, along with shifting their body weight between the leg straps.

Application

Having a coach film and evaluate your landings over a period of time is a great way to assess and track your progress. Developing an understanding of specific concepts that are vital to improving skill require a precise language. This streamlines the communication process and gives everyone involved a clearer picture of whether a task was executed properly. For example, during a standard final approach to landing, the system should be in full flight (hands up), and the wing should be "level." In this case, "level" means zero bank angle. The span of the canopy (a line connecting the wingtips) should be parallel with the horizon. When the pilot reaches the proper height to initiate applying the brakes for landing, the wing pitches nose up.

Next month, we will take a closer look at how a parachute moves around the three principal axes by discussing the primary and secondary effects of control inputs.

Information about AXIS' coaching and instructional services is available at axisflightschool.com. The author intends this article to be an educational guideline. It is not a substitute for professional instruction.