USERS GUIDE

General

This is a package of kOS scripts for RSS/RO/RP-1 gameplays. The scripts are designed to be efficient in terms of file size, so are less advanced cutting-edge than simple and robust. Every script comes in two versions:

- development version: easy-to-read-code for scripters. File name ends with "_dev"
- execution version: hard-to-read compressed version of the development version. Deleted comments, shortened variable names and other measures to save disk space. This is the version that should run on the kOS-Processor. File name does NOT end with "_dev"

apag

Acitve powered ascent guidance. Includes autostage und sbg. Purpose: Ascent Guidance for orbital rockets.

How it works: The vessel climbs vertically until the surface velocity exceeds the GT velocity. Then it pitches over at 85° pitch angle in the heading direction. When the pitch angle of the surface-prograde vector drops below 85°, the vessel follows in pitch the surface-prograde vector and in heading the entered heading. When EXECUTE is pressed, the active guidance is activated. The active guidance is not multi-stage capable, so you should activate it only when the final stage, carrying the payload, is running. The script cuts the throttle when the orbital velocity reaches the calculated target velocity. View "apag_doc.pdf" for full documentation.

Parameters: t0 (optional, default is 0), t1 (optional, default is 10). The parameters are implemented to stop oscillations, which occur in some circumstances.

- t0 (seconds, optional, default is 0): When the estimated burn time falls below t0, the script stops trying to match the periapsis height at burn end. Use this when the rocket starts oscillating wildly. So when oscillations start when the estimated remaining burn time is 17s, set t0 to 20s.
- t1 (seconds, optional, default is 10): When the estimated burn time falls below t1, the script stops recalculating the pitch program and uses instead the last calculated values. When using t0 does not help, use a higher value for t0.

The thrust vector must be parallel to the longitudinal axis.

autostage

Purpose: automatic staging.

How it works: The script decides to stage if KSP's DeltaV-Readout for the current stage is zero. Therefore, you have to release the launch clamps manually and stop the script, before it deploys the parachutes in space.

ldg

Simple propulsive autolander. Purpose: Automatic propulsive landing.

How it works: Set the maximum and minimum allowed landing speed. The scripts offers two landing modes:

- Bang-Bang: all-or-nothing mode in terms of thrust. Either the engine fires at full thrust or it fires not at all.
- Throttle: use-the-throttle mode.

The script calculates a conservative simplified allowed vertical speed dependent of the altitude above terrain. It uses the throttle to keep the craft's vertical speed beyond the calculated "red limit" (Suicide burn). When the vertical speed drops below the maximum landing speed, the script switches to touchdown control and holds the vertical speed between the maximum and minimum landing speed. When the crafts vertical speed drops below 0.1m/s (because it touches down), the throttle is cut and the program exits.

The thrust vector must be parallel to the longitudinal axis. The script is not multi-stage capable.

CAUTION: the script does not land in a certain place. It just controls the vertical speed with the throttle dependent of the mode.

CAUTION: a too shallow descent (depends from TWR) results in a too late upthrottling resulting in lithobraking. This is caused by a negative-radicand-prevention, which is necessary to avoid math errors.

WARNING: Because the script uses the current altitude above terrain, landing at mountainous terrain can end with lithobraking.

ldg2

Advanced propulsive autolander. Purpose: Advanced automatic propulsive landing.

How it works: Set the maximum and minimum allowed landing speed. The scripts offers two landing modes:

- Bang-Bang: all-or-nothing mode in terms of thrust. Either the engine fires at full thrust or it fires not at all.
- Throttle: use-the-throttle mode.

The script calculates the time to impact and compares is with the time needed to kill the velocity. It uses the throttle to maintain a constant ratio between impact time and burn time. When the vertical speed drops below the maximum landing speed, the script switches to touchdown control and holds the vertical speed between the maximum and minimum landing speed. When the crafts vertical speed drops below 0.1m/s (because it touches down), the throttle is cut and the program exits.

Parameter s (optional, default is 1): safety factor. A higher safety factor results in a lower deceleration, decreasing the chance of lithobraking and increasing gravity losses, a lower safety factor results in the opposite. A safety factor lower than 0.8 ends nearly always in lithobraking.

The thrust vector must be parallel to the longitudinal axis. The script is not multi-stage capable.

CAUTION: the script does not land in a certain place. It just controls the ratio of time-to-impact to burn time with the throttle dependent of the mode.

ndexe

Node executor. Purpose: Execute maneuver nodes.

How it works: The script orientates the spacecraft in node direction. It throttles up to execute the node and cuts the throttle when the node is executed. RCS has to be activated manually. The script is not multi-stage capable, so it works only well, when the full burn is executed with the same stage.

Parameters: tu (seconds, optional, default is 0): Ullage time. When using this parameter, the script fires up the RCS to deullage tu seconds before it throttles up (and ignites the main engines). Prevents time delay until engine start and therefore unprecise node exectution. Typical values are between 1 (full tanks, high-TWR-RCS) to 20 (nearly empty tanks, low-TWR-RCS).

The thrust vector must be parallel to the longitudinal axis.

sbg

Simple ballistic guidance. Includes autostage. Purpose: Guidance for ballistic rockets.

How it works: The vessel climbs vertically until the surface velocity exceeds the GT velocity. Then it pitches over at 85° pitch angle in the heading direction. When the pitch angle of the surface-prograde vector drops below 85°, the vessel follows in pitch the surface-prograde vector and in heading the entered heading. When the pitch angle falls below the target pitch, the script holds the pitch angle at the target pitch angle. It has to exit modes: in the first mode, activated by pressing EXIT the first time, the script stops when the next staging event is detected. In the second mode, activated by pressing EXIT the second time, the script stops immediately.

startup

File loading program.

How it works: by clicking on the buttons, the files are loaded into local storage.