Kerbal Space Program - Feedback #23225

Need for a "Swashplate" part to provide attitude control for helicopters

07/23/2019 04:35 AM - raptor9_ksp

Status:	Resolved		
Severity:	Low		
Assignee:			
Category:	Parts		
Target version:	1.10.0		
Version:	1.7.3	**Language:**	English (US)
Platform:	Linux, OSX, Windows	**Mod Related:**	No
Expansion:	Breaking Ground		

Description

There needs to be a way to properly control rotorcraft without having to resort to spamming reaction wheels onto a craft. Essentially, rotor blades in the Breaking Ground DLC aren't much different than the propeller blades in how they function. While they are effective at collectively providing lift, they do not have any attitude control capabilities, despite the pitch/roll/yaw modes being present in the Part Action Window (PAW).

Further, the rotation of the rotor blades themselves create a gyroscopic stabilization effect, much the way Control Moment Gyros stabilize the ISS. This requires a player to spam reaction wheels to control a rotorcraft's attitude, which can be problematic in itself since Reaction Wheel parts require a good deal of electric power, and are a band-aid solution at best. The larger the rotor system, more/larger reaction wheel parts are required to overcome the gyro-stabilization of the spinning rotors, consuming a great deal of electricity and causing additional mass to be added un-necessarily to the craft.

I propose a part that resembles the appearance of a helicopter's "swashplate" that can be fitted around the spinning rotor parts on the Breaking Ground DLC electric rotors and the Liquid Fuel-powered turboshaft engines. The part would generate the forces necessary to control the helicopter's attitude in two axes of rotation, but without having to add un-needed complexity in engineering a working swashplate piece-by-piece, which adds to part count and can be daunting for most players...aside from Azimech :P

Attached is a simplified graphic of how a swashplate generates rotation around the craft center-of-mass to control attitude. It doesn't go into the aerodynamics of helicopter rotor systems, nor the mechanics of a swashplate itself, but just the forces a tilting rotor disc exhibits on a rotorcraft for attitude control. Also, a suggestion of how a swashplate part would need to interact with the existing parts of a KSP craft to achieve such an effect. Keep in mind I'm not a coder, but I wanted to simplify it's implementation without turning it into a separate physics engine in itself.

Note: A rotor system doesn't generate thrust per se, it generates lift. I added the purple "Thrust" line onto the graphic to create the analogy of how this would work if you were to use high-mounted jet/rocket engines in the SPH to make a VTOL.

Some Youtube vids of swashplates in action:
Go to 5:00 (5 minutes) in: https://www.youtube.com/watch?v=XNd5cF2DIgI
Basic animation of a two-bladed semi-rigid rotor system: https://www.youtube.com/watch?v=7HBziltI_t4

History

#1 - 07/23/2019 04:38 AM - raptor9_ksp

- Description updated

#2 - 07/24/2019 02:49 AM - raptor9_ksp

- File Swashplate Concept.jpg added

A very rough approximation of how a "swashplate" part could be added to a rotor system as a singular part, procedurally-adapted based on the number of blade attachment nodes the rotor/turboshaft is configured to have in the PAW. In this case, three rotor blades, with the third blade not shown behind the rotor hub.

#4 - 07/06/2020 03:36 PM - victorr

- Status changed from New to Ready to Test

- Target version set to 1.10.0

We have made some changes in the most recent version and would like some feedback on this issue. Instead of adding a swashplate, 1.9 introduced

an improved blade system that mimics a real swashplate. Thanks.

#5 - 11/12/2020 01:43 AM - raptor9_ksp

- Status changed from Ready to Test to Resolved

This feedback item can be closed (the related feedback item identified has been similarly closed). The implementation for attitude control is good enough in my opinion to emulate rotorcraft functionality, despite it's limitations in the simulation.

Files

Helicopter Attitude Control.jpg	446 KB	07/23/2019	raptor9_ksp
Swashplate Concept.jpg	35 KB	07/24/2019	raptor9_ksp