

Kerbal Space Program - Bug #13121

Parts radially mounted flat onto sloped surfaces create excessive drag

10/27/2016 10:04 AM - blakemw

Status:	New	Start date:	10/27/2016
Severity:	Normal	% Done:	0%
Assignee:			
Category:	Physics		
Target version:			
Version:	1.2.0	Language:	English (US)
Platform:	Linux	Mod Related:	No
Expansion:			

Description

This issue is a little hard to explain but it should be very clear from screenshots, which compares radially mounted solar panels, mounted flat to the surface vs rotated to be vertical.

When a flat item like a radial parachute or solar panel is mounted to a sloped surface in a streamlined fashion it generates excessive drag because the game considers the cross section of the piece exposed to the air without considering whether or not it is streamlined relative to the surface it is mounted on. The drag can actually be greatly reduced by rotating it so it is vertical. While this has a certain logic to it from a game code perspective from an airflow simulation perspective it is patently absurd and very unexpected.

I've tested this issue in 3 different ways:

- Observing drag lines, as in the attached screenshots.
- Launching identical rockets except for flat vs vertical rotation of radially mounted chutes and seeing how fast they get (speed attained ~100m/s faster for vertical)
- Dropping identical drop-pods except for flat vs vertical rotation of radially mounted chutes and seeing how fast they fall (terminal velocity ~10m/s faster for vertical)

The amount of excessive drag is not insignificant especially considering the new importance of supersonic streamlining in 1.2.

History

#1 - 10/27/2016 02:17 PM - blakemw

- File *torque.jpg* added

A related thing is that a single (non-symmetry) radially mounted flat piece on a command pod or nose cone causes lift due to angle of attack, which then creates a torque on the rocket and can cause the rocket to veer off-course for no apparent reason. A common example is a single radial chute. The torquing effect is clearly observable by changing which face the flat item is mounted to. The XL solar panel makes a great exhibit piece.

I believe this is a major cause for rockets which "inexplicably" veer off course and likely also contributes to the phenomena where an otherwise reasonably designed rocket tumbles when it tries to go supersonic.

#2 - 10/28/2016 03:20 PM - Nebbie

Ah, the oddities of stock's aerodynamics model treating parts as if they weren't next to each other. I don't think this can be fixed without them actually rewriting how drag and lift are calculated.

Files

flat vs vertical.png	371 KB	10/27/2016	blakemw
drag much more severe.png	325 KB	10/27/2016	blakemw
torque.jpg	74 KB	10/27/2016	blakemw