

Kerbal Space Program - Feedback #7221

Parts destroyed by overheating abruptly increase temperature of attached parts, causing chain reaction

03/06/2016 02:05 PM - Kasuha

Status:	Needs Clarification		
Severity:	Normal		
Assignee:			
Category:	Physics		
Target version:			
Version:	1.0.5	Language:	English (US)
Platform:	Windows	Mod Related:	No
Expansion:			

Description

For some time I was wondering why are explosions caused by reentry heat so devastating and particularly why I often lose parts that did not even show temperature gauge right before the explosion.

The attached craft uses cockpit with thermal tolerance 2700 K and attached intake with thermal tolerance 2400 K. Immediately before the explosion, internal temperatures of parts are around 350 K, the intake skin temperature is getting near its limit while the cockpit is around 2200 K - quite safe zone. Immediately after explosion of the intake, the cockpit skin temperature abruptly jumps to 2697 K (+500K within one frame) and next moment the cockpit explodes too.

It just doesn't feel right. Even if there was actually something to explode on that intake (technically there is not, no fuel present, it's just some metal plates), it would just not have time to deploy so much heat on neighbor parts. The exploding intake was whole 300k cooler than the temperature to which it heated the cockpit.

If this is caused by transfer of heat from destroyed parts, then perhaps the rate of the transfer should be reconsidered.

If this is caused by thermal effect of the explosion, then again violence and mechanics of explosions of different parts should be perhaps reconsidered. There's little to explode on many KSP parts, there's no reason for them to create such large fireballs if they're not fuel tanks. And even if there is reason to explode, realistic explosions have thermal (heat wave) and mechanical (shockwave) effects with mechanical effects usually causing the most damage. KSP implementation seems to be way too much concentrated on heat.

History

#1 - 03/18/2016 11:57 PM - NathanKell

What's probably actually going on here is that before the shockwave was either detached, or attached to the intakes. That means the cockpit is behind the shock front. When they go, the shock becomes attached to the cockpit (and, if it was detached before, gets way hotter). This is intended behavior that vessel geometry really, really matters for hypersonic thermo, just as it matters for aero.

#2 - 03/19/2016 07:33 AM - Kasuha

- File screenshot13.png added

It did not occur to me to do this test before but yes, that's probably what happens. Apparently despite really small difference, uncovered cockpit heats up much more rapidly than cockpit with an intake.

#3 - 07/17/2016 09:44 AM - TriggerAu

- Status changed from New to Needs Clarification

Files

File Name	Size	Date	Author
ThermalChainReaction.craft	88.2 KB	03/06/2016	Kasuha
screenshot17.png	1.18 MB	03/06/2016	Kasuha
screenshot18.png	1.33 MB	03/06/2016	Kasuha
screenshot19.png	1.07 MB	03/06/2016	Kasuha
screenshot23.png	887 KB	03/06/2016	Kasuha
screenshot13.png	1.5 MB	03/19/2016	Kasuha