Ballistics Coefficients − was Re: The foam did not do it

Source: http://sci.tech−archive.net/Archive/sci.space.shuttle/2006−02/msg00402.html

- *From*: "Rob" <rstevens42@xxxxxxxxxxx>
- *Date*: 28 Feb 2006 11:42:34 −0800

Katipo wrote:

> Because the falling form has a very large surface area and relatively low mass it quickly slowed down as soon as it separated from Columbia, resulting in Columbia's wing in effect running into the foam at about 500 miles per hour.

> Can you clarify (for this non−physicist) what you mean by "running into the foam". Surely you are not saying the foam dislodged from above the wing? If so how did it come to hit the underside of the wing?
>
> Katipo

I didn't comprhend it properly until I read "Columbia − Final Voyage" which has a very understandable explanation for how the foam hit the wing with such a high velocity.

In the case of Columbia the foam came from the bipod (forward fitting) which is located underneath the crew cabin and well in front of the wing. The foam quickly slowed down while the shuttle continued to move forward and unfortunately the path the foam took put it directly in the path of the leading edge of the wing.

Imagine tossing sheets of paper out of the window of a car driving down the road, one of them flat, one of them crumbled into a small wad. The flat sheet of paper will flop around more while the crumbled up paper will fall more quickly. If you do the experiment in a vacuum then the two pieces will fall on the same parabolic path. (BTW − the best proof that the moon landings took place − look at the dust kicked up by the lunar rover tires − it falls in a perfect parabolic path which would only happen in a vacuum, and their ain't no vacuum chamber larget enough to fake that!)

Or fire a cork out of pop gun out of a car going down the highway

pointed forward. The cork will quickly slow down while the car continues to power down the highway. If the cork has a large enough surface area and the car's moving fast enough then theoretically the difference in velocity could result in the cork hitting and damaging your car's windshield.

It's important to note that it took several months after the accident, with plenty of analysis, to determine exactly where the foam hit. During the mission the limited data from the launch video led engineers to believe that it had probably hit the black tiles on the bottom of the wring, but they were able to determine the velocity and mass of the foam reasonably accurately based on the video data.

Read "Columbia − Final Voyage", it's got a lot of good information.

Now quit imagining tossing litter out of your car and imagine picking up those pieces so you don't litter your imaginary highway. ;−)

Rob Stevens

.