Jason Byrne <jbyrne6@gmail.com>

error bars

4 messages

james mcateer <j.mcateer@helio.gsfc.nasa.gov> **8 January 2008 21:02**
To: Jason Byrne <jbyrne6@gmail.com>
Cc: Peter Gallagher <peter.gallagher@tcd.ie>

This website describes the physics101 approach to errors

http://www.rit.edu/~uphysics/uncertainties/Uncertaintiespart1.html

The basic outcome is that

(1) for the 'average errors' approach
z=x*y
dz/z = dx/x + dy/y
This is what you have been doing

(2) Use the 'standard deviation error' approach.
In this case

z=x*y
(dz/z)^2. = (dx/x)^2 + (dy/y)^2

Note that error propagation is the same for multiplication and division.
You should try both methods and compare answers. So in the second case your error propagation in v is

dv = v(sqrt ((dh/h)^2 + (dt/t)^2))

Also, we were having a bit of a chat about your dt value, and you are probably over estimating it. *IF* you are not using any difference imaging, then your dt is just the time it takes to make your image (i.e., the exposure time) meaning your dt will be a lot smaller than the 'time-between-images' value. This is one of the major parts of your work we have to stress. By getting the fronts from from the actual images (as opposed to running difference) you have much smaller dt, hence smaller error bars in 'v' and 'a'. This means we can start to actually test theories. Previously the bad cadence and running difference methods meant we could not discount any theory.

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Jason Byrne <jbyrne6@gmail.com> **9 January 2008 14:12**
To: james mcateer <j.mcateer@helio.gsfc.nasa.gov>
Cc: Peter Gallagher <peter.gallagher@tcd.ie>

Afternoon,
I've run through those steps now to produce the attached - no smoothing, error propagation (1) though there's no big difference when I used (2), and time errors of exposure time ~20s.
Still quite a scatter, and see the vel & accel errors are a lot smaller now. What do you think?
Jason.

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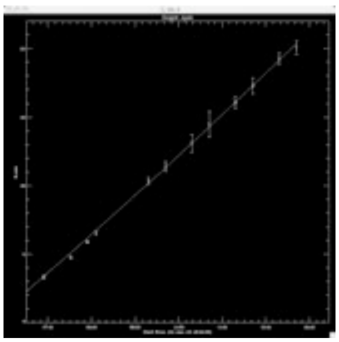
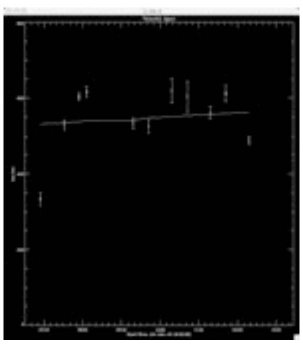
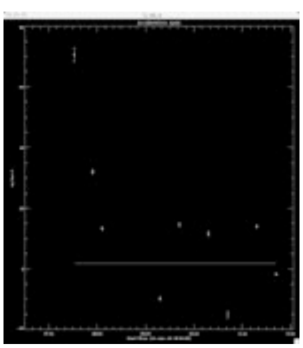
3 attachments



height_fit.tiff
34K



Vel_fit.tiff
34K



accel_fit.tiff
34K

Peter Gallagher <peter.gallagher@tcd.ie> **9 January 2008 14:53**
To: Jason Byrne <jbyrne6@gmail.com>
Cc: james mcateer <j.mcateer@helio.gsfc.nasa.gov>

Hi Jason,

The uncertainties in v(t) and a(t) certainly look more consistent with what others have found. Unfortunately the scatter is still terrible in v(t) and a(t). See for comparison the v(t) from the CDAW list for this event:

http://cdaw.gsfc.nasa.gov/cme_list/UNIVERSAL/2000_01/htpng/20000102.053005.p240s.htp.html

Might be worth seeing if you can reproduce their v(t) plot using their h(t) data from

http://cdaw.gsfc.nasa.gov/cme_list/UNIVERSAL/2000_01/yht/20000102.053005.w107n.v0603.p240s.yht

At least then you'll know if your method is ok.

Also, have you tried comparing forward, reverse and centre-difference methods that we discussed before Christmas?

Any idea why the model v(t) is not linear in your plot (ie seems to show some scatter)? This might be a clue as to why the derivative is not working too well.

Want to chat at 4?

Peter.

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> [Quoted text hidden]
> <height_fit.tiff><Vel_fit.tiff><accel_fit.tiff>

Jason Byrne <jbyrne6@gmail.com> **9 January 2008 14:51**
To: Peter Gallagher <peter.gallagher@tcd.ie>

Cool, I'll follow this stuff up and call down at 4. Thanks.

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