
Subject: Re: Strange floating-point precision behavior

Posted by [tim](#) on Sun, 09 Feb 2003 02:28:20 GMT

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In my haste I had neglected to do a proper search of this newsgroup's archives. I see now that double-precision values are inherently off by a small amount. Given that, I am looking for suggestions on how better to handle double-precision values so that I get exact results from my calculations.

Thanks.

On 8 Feb 2003, Tim Lloyd wrote:

```
> I have written a routine that converts Earth-Centered Inertial
> coordinates in x/y/z to geodetic latitude/longitude/altitude using the
> WGS84 standard. I have one issue, however, that I believe is
> affecting my calculations of altitude so that they are accurate only
> to 1-meter resolution. I am defining the ECI coordinates as
> double-precision:
>
> IDL> boulder={x:-1283388.8693d0, $
> y:-4713016.9053d0, $
> z:4090191.0471d0} ;Boulder, CO, GPS station
>
> and yet IDL seems to be storing the data incorrectly:
>
> IDL> print,boulder,format='(3f20.10)'
> -1283388.8692999999 -4713016.9052999998 4090191.0471000001
>
> What am I doing wrong? I am fairly certain that this behavior is
> responsible for my calculations yielding 1674.6658 m as the altitude
> of the Boulder GPS station, and not 1674.7428 m (the actual altitude).
> This is on IDL 5.6 for Mac OS X.
>
> Thanks,
> Tim Lloyd
> Laboratory for Atmospheric & Space Physics
>
```

Tim Lloyd, lloyd@lasp.colorado.edu

SNOE Mission Operations Lead Flight Controller

Laboratory for Atmospheric and Space Physics

"The eyes of the world now look into space, to the moon and to the planets beyond, and we have vowed that we shall not see it governed by a hostile flag of conquest, but by a banner of freedom and peace."

-- John F. Kennedy

Subject: Re: Strange floating-point precision behavior
Posted by [Kenneth P. Bowman](#) on Sun, 09 Feb 2003 02:31:42 GMT
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In article <e41fb407.0302081533.3874340f@posting.google.com>,
lloyd@lasp.colorado.edu (Tim Lloyd) wrote:

```
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> coordinates in x/y/z to geodetic latitude/longitude/altitude using the
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```

Double precision gives you about 14 digits of decimal precision. You are only providing about 10 digits, and you are getting out exactly what you put in:

```
-1283388.8693 = -1283388.8692999999
```

within better than 14 digits.

Ken Bowman
