Subject: satellite orbit computation in IDL
Posted by cseynat on Thu, 04 Mar 2004 00:39:15 GMT
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Hello all,

I am looking for IDL routines computing satellite positions as a function of time, given a set of initial orbital parameters.

I have implemented basic orbit computation routines myself (based on Keplerian parameters), but I am looking for very accurate orbit propagation involving atmospheric drag, luni-solar perturbations, earth tides etc.

I have looked on the IDL libraries available on the web but did not find anything. If you have implemented such routines or if you can suggest who I can contact, I would very much appreciate to hear from you.

Many thanks
Cedric

Subject: Re: satellite orbit computation in IDL
Posted by Craig Markwardt on Fri, 05 Mar 2004 04:57:03 GMT
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profxtjb@earthlink.net (Thomas Brueckner) writes:
> Craig Markwardt <craigmnet@REMOVEcow.physics.wisc.edu> wrote in message news:
>> I have a high precision predictor corrector integrator on my web page.
>
> Craig, which bundle in your library contains the predictor-corrector? Quadpack?

It's under "Math", and the routine is called DDEABM, the ABM being for the Adams-Bashford-Moulton predictor-corrector method. It's more or less a direct translation of the same routine in the DEPAC library, originally by the ubiquitous Dr. Shampine and collaborators.

Craig

P.S.
http://cow.physics.wisc.edu/~craigm/idl/idl.html

--

Craig B. Markwardt, Ph.D. EMAIL: craigmnet@REMOVEcow.physics.wisc.edu
Astrophysics, IDL, Finance, Derivatives | Remove "net" for better response

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Subject: Re: satellite orbit computation in IDL
Posted by Roberto Monaco on Fri, 05 Mar 2004 23:42:42 GMT
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Cedric,

I took an existing C implementation of the SGPSDP orbital model by NORAD (I can't remember the link now) and wrapped it into a DLL, so that I could use from IDL (under Windows). I don't have this in an FTP server, but if you are interested I can send you the DLL, DLM, and a test IDL program (that shows how to use it).

To get meaningful information you need an actualized TLE file for the satellite or satellites you are interested in, which you can get from http://www.celestrak.com

There are two main functions from IDL:
- SGPSDP_INIT(tle_file, satellite_ID)
- SGPSDP_GETSAT (date_time, satellite_structure)

You call the SGPSDP_INIT to load the satellite orbital parameters from the TLE file (for a certain satellite), and to do some initializations. After this you call SGPSDP_GETSAT as many times as needed, to get the geographical position of the satellite (latitude, longitude, altitude) for a certain time (Julian date). This last function assumes a satellite structure which is shown in the IDL test program. SGPSDP_GETSAT also copies the previous time and position in the structure for convenience of use (I thought it was good to keep both, previous call and current call data together). You need to call SGPSDP_INIT again only if you change satellite, or TLE file, or both.

There is a third function that defines the position of an observer, needed to determine if the satellite is eclipsed or under sun light from the observer's position (if you care about this):
- SGPSDP_SETOBS(observer_data)

I don't have a documentation page (sorry), but I think all the parameters are shown in the test program.

I tested this against data provided in NORAD documentation, also using Dr. Kelso TrakStar program (http://www.celestrak.com), and finally with STK. It looks OK, but I can't honestly say that I have tested it thoroughly.

Regards,
Roberto Monaco
rmonaco@coresw.com

Subject: Re: satellite orbit computation in IDL
Posted by schaa on Mon, 08 Mar 2004 14:55:54 GMT
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Cedric Seynat wrote:
> Hello all,
>
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> function of time, given a set of initial orbital parameters.
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> propagation involving atmospheric drag, luni-solar perturbations,
> earth tides etc.
>
> I have looked on the IDL libraries available on the web but did not
> find anything. If you have implemented such routines or if you can
> suggest who I can contact, I would very much appreciate to hear from
> you.

Hi Cedric,
perhaps the NAIF-group from NASA provides something that you are looking for: high precision orbit calculations. The tool provided by NAIF is called Spice, take a look at the website http://naif.jpl.nasa.gov/naif.html.
This week the Icy-package for IDL version 1.0 (!) is out and can be found on the ftp-server of NAIF, (under 0:/pub/naif/misc/edw/icy/).

Icy has to be linked against IDL's export.h (external directory) and can be used as a dlm-kind of thing ...
An example from the Spice-tutorial is:

""
Check whether the angle between (Cassini) camera boresight and
direction to Sun is within allowed range:
cspice_spkpos(ï¿½SUN', ET, ï¿½CASSINI_ISS_NAC', ï¿½LT+S',
ï¿½CASSINI',
SUNVEC, LT)
angle = VSEP(NAC_BORESIGHT_nac, SUNVEC)
""
and a lot more ...

It's open source, free and Naif answers Mails!

Best regards
-Ralf

Subject: Re: satellite orbit computation in IDL
Posted by CED on Mon, 12 Apr 2004 01:57:59 GMT
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Hello Roberto,

Yes I'd like to have a look at the DLL you generated, and how you used it with IDL.

From my experience, calling a Windows DLL from IDL is not totally robust and I sometimes got trouble with this method, especially when the DLL is called in an IDL loop.

I need to compute orbits of GPS satellites and there are about 30 of them, so I may run into performance problems by calling a Windows DLL, but it is worth a try.

I would appreciate if you cold send me your code, as mentioned in your reply.

Thanks for your help,

Cedric

Subject: Re: satellite orbit computation in IDL
Posted by Roberto Monaco on Mon, 12 Apr 2004 19:53:44 GMT
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Cedric,

I am sending you a copy. Let me know how it fits within your application, and any comments/feedback.

Cheers,
Roberto

"CED" <cseynat@swiftdsl.com.au> wrote in message
news:ffa744684128602b8872c73db657d192@localhost.talkaboutpro gramming.com...
> Hello Roberto,
>
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>
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> reply.
>
> Thanks for your help,
>
> Cedric
>
