Subject: Re: Range of "Spherical Coordinates" in SPHER_HARM
Posted by jameskuyper on Thu, 09 Oct 2008 17:18:15 GMT
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Karlo Janos wrote:
> Hello all!
>
> I am a little bit confused about the usage of spherical coordinates in
> the function SPHER_HARM.
> The first parameter should be the azimuthal angle theta (in the help
> document named 'polar' or 'colatitudinal') and the second parameter the
> polar angle phi (in the help document named 'azimuthal' or
> 'longitudinal').
> According to the example code at the end of the help page the range for
> theta seems to be [0; pi] as I would have presumed. But what is the
> range for phi? [0; 2pi] or [-pi; pi]? In some functions (where the
> keyword '/DEGREES' is possible) it must be the latter, relating to the
> coordinate system of the earth. But what about SPHER_HARM? I did not
> find any explanation about the definition of theta and phi there.

It is a fundamental feature of the spherical coordinate system that theta and theta+2*!PI represent the same location, and similarly for phi and phi+2*!PI. For this reason, the spherical harmonic functions must show these same symmetries. It is no coincidence that that the spherical harmonics are calculated by first calculating cos() and sin() of theta and phi (or integer multiples thereof), and then using those values for all subsequent calculations. There is therefore no reason for SPHERE_HARM to impose any arbitrary limits on either theta or phi, whether or not the /DEGREES option is turned on. I don't believe that it imposes any such limits, my tests reveal none.