
Subject: Re: Latitude longitude and Image Navigation
Posted by [Brian Wolven](#) on Fri, 24 Jun 2011 17:08:37 GMT
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As I recall, I was generating a lat-long grid to overlay on HST/STIS images of Galilean satellites. It looks like I used the North Pole position vector and the sub-observer point (calculated in SPICE) to get the viewing orientation and then drew the projected lat-long grid based on that information. This was a long time ago (15 years?), albeit in galaxy not so far away. I think the code below is what I used to calculate the rotation matrix for the grid; I don't know if it will help or not. Looks like I first rotated the z-axis to be aligned with the pole vector, then found the rotation about the pole to place the sub-observer point at the proper coordinates.

```
function polar_rotation,body
;=====
;=====
; Rotate z-axis into specified pole position vector (nppv)
;=====
;=====
    nppv = fourvector(unit_vector(body.nppv)) ; unit 4-vector along NPPV
    zaxis = [0.,0.,1.,0.]
    rpol1 = rotate_a2b(zaxis,nppv)
;=====
;=====
; Latitude must be converted from planetographic to planetocentric coordinates.
; Planetocentric co-latitude is equivalent to theta in spherical coordinates.
; -1 * longitude is equivalent to phi in spherical coordinates.
;=====
;=====
    axisratio = body.r_polar/body.r_equatorial
    sublatg = body.subobsvrlat
    sublatc = pg2pc_lat(sublatg,axisratio)
    subcolat = (90.-sublatc)*!dtr ; theta in spherical coords
    sublon = -1.*body.subobsvrlon*!dtr ; phi in spherical coords
;=====
;=====
; Rotate body such that line of sight intersects specified subobserver point.
; Rotate only in the plane perpendicular to the pole (nppv)
;=====
;=====
    subdes = [cos(sublon)*sin(subcolat),sin(sublon)*sin(subcolat),cos(sub colat)]
    subcur = -1.*body.pos/length(body.pos) ;
    oldang = angle_between(subdes,zaxis)
    bodang = angle_between(subcur,nppv)
    subdes = fourvector(subdes)#rpol1 ;4-vector of desired sub-observer pt
    subcur = fourvector(subcur) ;4-vector of initial sub-observer pt
    newang = angle_between(subdes,nppv)
    newdes = subdes - nppv*dot_product(nppv,subdes) ; Project components on plane
```

```

newsub = subcur - nppv*dot_product(nppv,subcur) ; perpendicular to nppv.
rpol2 = rotate_a2b(newdes,newsub)
finang = angle_between(subdes#rpol2,nppv)
;=====
=====
; Diagnostics
;=====
=====
; print,'Curr: ',float(reform(subcur))
; print,'Dsrd: ',float(reform(subdes))
; print,float(reform([sublon!/dior,sublatg!/dior,sublatc,subco lat!/dior]))
; print,float([bodang,oldang,newang,finang])
;=====
=====
; Return total matrix to calling procedure.
;=====
=====
return,rpol1#rpol2
end

```
