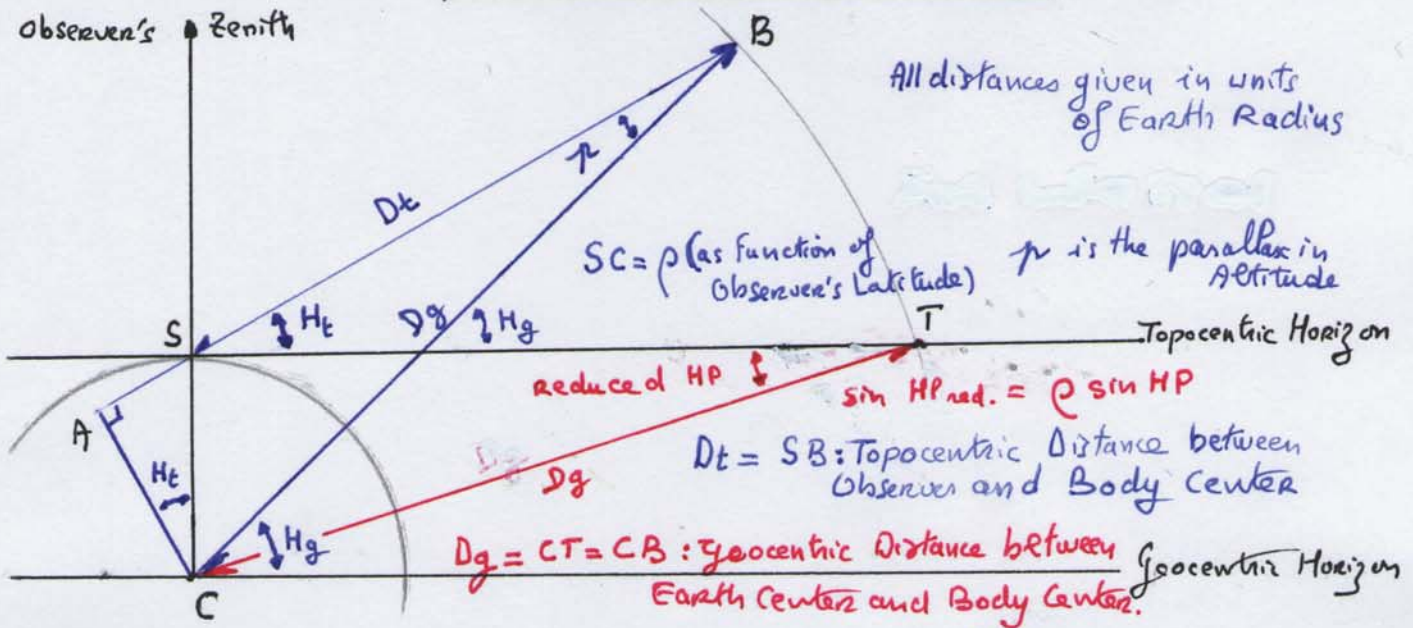


ALMOST PERFECTLY *ACCURATE COMPUTATION FOR PARALLAX IN HORIZONTAL COORDINATES



$$\sin HP = \frac{\text{Earth Radius}}{CT} = \frac{1}{D_g} \quad \text{For the Moon, } \sin SD_g = \frac{1738}{6378.137} \sin HP$$

Let R_b be the Body Radius, SD_g : Geocentric SD and SD_t : Topocentric SD

$$\text{then: } \sin SD_g = \frac{R_b}{D_g} \quad \text{and} \quad \sin SD_t = \sin SD_{augmented} = \frac{R_b}{D_t}$$

Principal formulae: $H_g = H_t + p$

$$\sin p = \frac{CA}{CB} = \frac{SC \cos H_t}{CB} = \frac{\rho \cos H_t}{CT} = \rho \cos H_t \sin HP$$

If you know H_t ,
Start here $\rightarrow$

If you know H_g ,
Start here $\rightarrow$

(1) From H_t , compute $\sin p = \rho \cos H_t \sin HP$

(2) $H_g = H_t + p$

(3) Compute $(D_g \cos H_g, D_g \sin H_g)$

(4) Compute $\begin{cases} D_t \cos H_t = D_g \cos H_g \\ D_t \sin H_t = D_g \sin H_g - p \end{cases}$

(5) Compute $D_t = \sqrt{(D_t \cos H_t)^2 + (D_t \sin H_t)^2}$

Compute $H_t = \text{Atan} \left(\frac{D_t \sin H_t}{D_t \cos H_t} \right)$

(6) Compute $\sin SD_t = \frac{D_g}{D_t} \sin SD_g$

(7) Compute $SD_t = \text{ARCSIN}(\sin SD_t)$

MOON EXAMPLE with $D_g = 60$,
 $HP = 0^\circ 9549739$, $SD_g = 0^\circ 2602129$

(1) $H_t = 53^\circ$, $\sin p = 0.0038798$

(2) $\rho = 0.985$, $H_g = 53^\circ + 0.5660749 = 53^\circ 5660749$

(3) $D_g \cos H_g = 35.633177$, $D_g \sin H_g = 48.7725405$

(4) $D_t \cos H_t = 35.633177$
 $D_t \sin H_t = 47.2875405$

(5) $D_t = 59.2104156$

$H_t = 53^\circ 0000000$
(H_t value hereabove is a check)

(6) $\sin SD_t = 0.0046021$

(7) $SD_t = SD_{augmented} = 0.2636829$

NOTE (1) IF you know H_t , in order to compute SD augmented, you need to "travel" all the way from step (1) through step (7)

* NOTE (2) The algorithm hereabove is almost "perfectly" accurate and quite sufficient for the MOON (better than 0.01"). However, because on an Ellipsoid, the Earth center is generally NOT on the Observer's vertical line (NADIR), for utmost accuracy (satellite) computations cannot be carried out in a 2 dimension plan, But in 3 dimension space -
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