On Brünnow's Method of correcting the Orbit of a Comet.

In the method of varying distances for the correction of a comet's orbit occur the following formulae

$$\begin{aligned} \Delta \cos \beta \cos (\lambda - G) + g &= h' \cos \zeta' \cos (H' - G) = x' \\ (a) \quad \Delta \cos \beta \sin (\lambda - G) &= h' \cos \zeta' \sin (H' - G) = y' \\ \Delta \sin \beta &= h' \sin \zeta' = z' \end{aligned}$$

where x' , y' , z' , are the coordinates of the first place of the comet referred to the last place of the earth.

If the first equation be multiplied by $\cos (\lambda - G)$ and the second by $\sin (\lambda - G)$, adding and transposing, we have

$$\Delta \cos \beta = h' \cos \zeta' \cos (\lambda - H') - g \cos (\lambda - G)$$

Dividing by the last of equations (a)

$$(b) \quad \cot \beta = \cot \zeta' \cos (\lambda - H') - \frac{g \cos (\lambda - G)}{h' \sin \zeta'}$$

which will be found a very convenient check.

To illustrate let $\log \Delta = 0.212800$, $\log g = 0.083425$, $\beta = 46^\circ 18' 40''.7$, $\lambda = 93^\circ 6' 10''.6$ and $G = 157^\circ 39' 3''.3$. The computation will be as follows:

$\sin \beta$	9.859200
Δ	0.212800
$\cos \beta$	9.839314
$\sin (\lambda - G)$	9.955662
$\Delta \cos \beta$	0.052114
$\cos (\lambda - G)$	9.633221
g	0.083425
	0.146085
$\Delta \cos \beta \cos (\lambda - G)$	9.685335
$h' \cos \zeta' \cos (H' - G)$	0.229510
$\cos, \sin$	9.933200
$h' \cos \zeta' \sin (H' - G)$	0.007776

$$H' - G \quad 329^\circ 1' 46''.5$$

$$G \quad 157 \quad 39 \quad 3.3$$

$$\lambda \quad 93 \quad 6 \quad 10.6$$

$$H' \quad 126 \quad 40 \quad 49.8$$

$$\lambda - H' \quad 326 \quad 25 \quad 20.8$$

$$h' \cos \zeta' \quad 0.296310$$

$$\cos, \sin \quad 9 \quad 933879$$

$$1 \quad h' \sin \zeta' \quad 0.072000$$

$$2 \quad g \cos (\lambda - G) \quad 9.716646$$

$$3 \quad \cot \zeta' \quad 0.224310$$

$$4 \quad \cos (\lambda - H') \quad 9.920717$$

$$3 + 4 \quad 0.145027$$

$$9.835087$$

$$2 - 1 \quad 9.644646$$

$$\cot \beta \quad 9.980114$$

$$h \quad 0.362431$$

It will be seen that $\cos (\lambda - H')$ is the only trigonometric function required for the check which is not already given.

For finding ϕ' (i. e. the angle at the last place of the earth between the actual first and last places of the comet) the following are preferable to the ordinary formulae on account of their perfect certainty

$$m \sin M = h' \cos \zeta' \cos (\lambda'' - H)$$

$$m \cos M = h' \sin \zeta'$$

$$h' \sin \phi' \cos N = m \cos (M + \beta'')$$

$$h' \sin \phi' \sin N = h' \cos \zeta' \sin (\lambda'' - H)$$

$$h' \cos \phi' = m \sin (M + \beta'')$$

ϕ' and N need not actually be written down. The work is checked if $h' = h'$ found from $h' \cos \zeta'$, $h' \sin \zeta'$.

August 14, 1874.

Ormond Stone.

Verkäufliches Instrument.

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