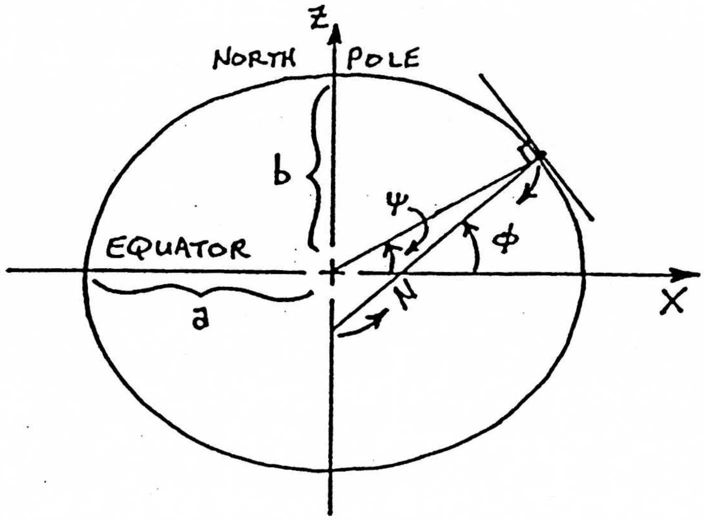
GEOMETRY OF THE MERIDIAN ELLIPSE



GIVEN: a & b

$$f = (a-b)/a$$

$$e^2 = 2f - f^2 \quad \text{OR}$$

$$e^2 = (a^2 - b^2)/a^2$$

GIVEN: a & $1/f$

$$b = a(1-f)$$

$$e^2 = 2f - f^2$$

---

a = SEMI-MAJOR AXIS

b = SEMI-MINOR AXIS

c = POLAR RADIUS OF CURVATURE

f = FLATTENING

e = ECCENTRICITY

e' = SECOND ECCENTRICITY

N = LENGTH OF NORMAL

M = MERIDIAN RADIUS OF CURVATURE

V = INTERMEDIATE VALUE

W = INTERMEDIATE VALUE

X = X COORDINATE

Z = Z COORDINATE

ϕ = PHI, GEODETIC LATITUDE

or { θ = THETA, REDUCED LATITUDE
{ β = BETA, PARAMETRIC LATITUDE

ψ = PSI, GEOCENTRIC LATITUDE

$$e'^2 = (a^2 - b^2)/b^2$$

$$e'^2 = e^2/(1-e^2)$$

$$c = a^2/b$$

$$N = \frac{a}{(1-e^2 \sin^2\phi)^{1/2}}$$

$$M = \frac{a(1-e^2)}{(1-e^2 \sin^2\phi)^{3/2}}$$

$$W^2 = (1 - e^2 \sin^2\phi)$$

$$V^2 = (1 + e'^2 \cos^2\phi)$$

(also) $N = a/W$ OR c/V

" $M = \dfrac{a(1-e^2)}{W^3}$ OR $\dfrac{c}{V^3}$

$$X = \frac{a \cos\phi}{(1-e^2 \sin^2\phi)^{1/2}} = \frac{a\cos\phi}{W}$$

$$Z = \frac{a(1-e^2)\sin\phi}{(1-e^2 \sin^2\phi)^{1/2}}$$

$$Z = \frac{a(1-e^2)\sin\phi}{W}$$

$$\tan\psi = \sqrt{1-e^2}\,\tan\theta = (1-e^2)\tan\phi$$

or β