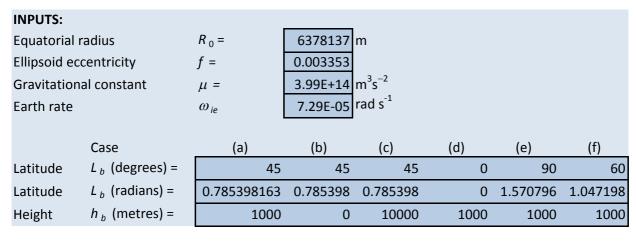
EXAMPLE 2.3 Calculation of Gravity at various latitudes and heights



Polar radius, $R_P = (1 - f)R_0$ Eccentricity, e 6356752.314 m 0.081819191

Surface acceleration due to gravity (Somigliana model)

From (2.134),

$$g_0(L_b) \approx 9.7803253359 \quad \frac{(1+0.001931853 \sin^2 L_b)}{\sqrt{1-e^2 \sin^2 L_b}} \text{ m s}^{-2}$$

Down component of acceleration due to gravity

From (2.139),

$$g_{b,D}^{n}(L_{b},h_{b}) \approx g_{0}(L_{b}) \left\{ 1 - \frac{2}{R_{0}} \left[1 + f \left(1 - 2 \sin^{2} L_{b} \right) + \frac{\omega_{ie}^{2} R_{0}^{2} R_{P}}{\mu} \right] h_{b} + \frac{3}{R_{0}^{2}} h_{b}^{2} \right\}$$

North component of acceleration due to gravity

From (2.140), $g_{b,N}^{n}(L_b, h_b) \approx -8.08 \times 10^{-9} h_b \sin 2L_b \text{ m s}^{-2}$

Case	(a)	(b)	(c)	(d)	(e)	(f)
$g_0(L_b) \approx$	9.806197771	9.806198	9.806198	9.780325	9.832185	9.819177
$g_{b,D}^n(L_b,h_b) \approx$	9.803112948	9.806198	9.775415	9.777238	9.829102	9.816093
$g_{b,N}^{n}(L_{b},h_{b}) \approx$	-0.00000808	0	-8.1E-05	0	-9.9E-22	-7E-06