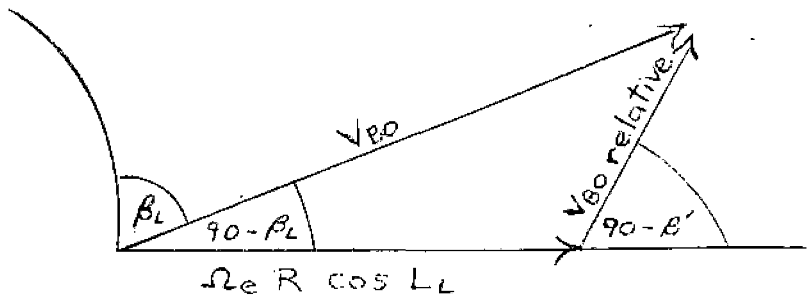
2.9 Solve for Maneuver Positions and Launch Azimuth (Continued)

$\beta_L = \sin^{-1} [\cos i_t / \cos L_L]$

An additional component is produced by the earth's rotation which is approximately 465 cos L_L mps.



$$V_{BO}^2 \text{relative} = V_{BO}^2 + (\Omega_e R \cos L_L)^2 - 2 V_{BO} \Omega_e R \cos L_L \cos (90 - \beta_L)$$

$$\cos (90° - \beta_L) = \sin \beta_L = \frac{\cos i_t}{\cos L_L}$$

$$V_{BO}^2 \text{rel} = V_{BO}^2 (\Omega_e R_e \cos L_L)^2 - 2 V_{BO} \Omega_e R \cos i$$

$$\frac{V_{BO}}{\sin (90° + \beta^1)} = \frac{V_{BO} \text{ rel}}{\sin (90° - \beta_L)}$$

$$\frac{V_{BO}}{\cos \beta^1} = \frac{V_{BO} \text{rel}}{\cos \beta_L}$$

$$\cos \beta^1 = \frac{V_{BO}}{V_{BO} \text{ rel}} \cos \beta_L$$

B^1 = azimuth in which the vehicle must be fired.

Assumption: distance and time spent during ascent to the point of burnout are small.