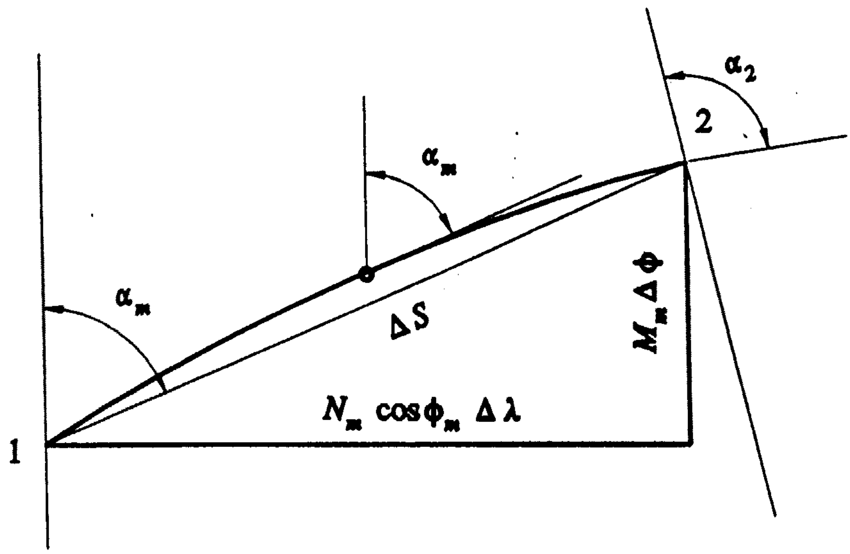
Differential Plane Triangle Geodetic Elements

Very precise geodetic computations can be performed by using small plane triangles and updating the azimuth for each element using Clairaut's Constant. If traverse increments are limited to about 200 meters, the differential geometry method of geodetic traverse will provide answers correct within millimeters for any length of line (Jank/Kivioja, 1980).

The choice for a user is, "Do I wish to perform one lengthy recipe type computation which, although it is approximate, provides very good answers for lines up to about 60 miles long. Or is it preferable to perform a simple plane triangle type computation many times over and accumulate the pieces to get a very precise answer?" Having a computer available to perform the computations may be pertinent in either case.



$$M = \frac{a(1 - e^2)}{(1 - e^2 \sin^2 \phi)^{3/2}}, \qquad N = \frac{a}{(1 - e^2 \sin^2 \phi)^{1/2}} \qquad (1) \text{ \& } (2)$$

$$CC = N_1 \cos\phi_1 \sin\alpha_1, \qquad \sin\alpha_2 = \frac{CC}{N_2 \cos\phi_2} \qquad (3) \text{ \& } (4)$$

$$M_m \Delta\phi = \Delta S \cos\alpha_m, \qquad \Delta\phi = \frac{\Delta S \cos\alpha_m}{M_m} \qquad (5) \text{ \& } (6)$$

$$N_m \cos\phi_m \Delta\lambda = \Delta S \sin\alpha_m, \qquad \Delta\lambda = \frac{\Delta S \sin\alpha_m}{N_m \cos\phi_m} \qquad (7) \text{ \& } (8)$$