TABLE E.4 Calculated Satellite Position in ECEF Coordinates

Variables	Values	Units
A	2.6559e+07	m
n_0	1.4587e-04	rad/s
Δt_{sv}	3.2965e-05	s
t	4.0327e+05	s
t_k	−7.1271e+03	s
n	1.4587e-04	rad/s
M_k	1.2033e+00	rad
E_k	1.2073e+00	rad
v_k	1.2113e+00	rad
ϕ_k	3.2735e-01	rad
δu_k	−2.0003e-06	rad
δr_k	1.4310e+02	m
δi_k	5.4489e-08	rad
u_k	3.2735e-01	rad
r_k	2.6519e+07	m
i_k	9.7477e-01	rad
x'_k	2.5111e+07	m
y'_k	8.5267e+06	m
Ω_k	−2.7116e+01	rad
x_k	−5.67841101e+06	m
y_k	−2.49239629e+07	m
z_k	7.05651887e+06	m

The F in this equation is a slant correction factor and is distinct from the constant used in Eq. (E.5). Because of the eight-coefficient constraint, a study was performed to determine how to best allocate the eight GPS message coefficients to the four parameters of Eq. (E.6). The model was found to be most sensitive to the amplitude AMP and period PER terms. Therefore, b and ζ are represented by constant terms in the model. Third-order polynomial expansions are used for AMP and PER.

The inputs to the model are the user geodetic latitude λ and longitude ϕ, the GPS time t_{gps}, and the user relative azimuth A and elevation E of the satellite. The GPS message supplies four α and four β parameters. The algorithm proceeds as follows:

1. From the satellite elevation, compute the earth central angle between the user position and the earth projection of the ionospheric intersection point:

$$\psi = \frac{0.0137}{E + 0.11} - 0.022 \tag{E.7}$$