Kinematic Equations of Linear and Rotational Motion (here motion of frame $\{2\}$ wrt/frame $\{0\}$ using an intermediate frame $\{1\}$):

$$\begin{aligned}
C_2^0 &= C_1^0 C_2^1 && (1)\\
\vec{\omega}_{02}^0 &= \vec{\omega}_{01}^0 + C_1^0 \vec{\omega}_{12}^1 && (2)\\
\dot{\vec{\omega}}_{02}^0 &= \dot{\vec{\omega}}_{01}^0 + \left[\vec{\omega}_{01}^0 \times\right] C_1^0 \vec{\omega}_{12}^1 + C_1^0 \dot{\vec{\omega}}_{12}^1 && (3)\\
\vec{r}_{02}^0 &= \vec{r}_{01}^0 + C_1^0 \vec{r}_{12}^1 && (4)\\
\dot{\vec{r}}_{02}^0 &= \dot{\vec{r}}_{01}^0 + \left[\vec{\omega}_{01}^0 \times\right] C_1^0 \vec{r}_{12}^1 + C_1^0 \dot{\vec{r}}_{12}^1 && (5)\\
\ddot{\vec{r}}_{02}^0 &= \ddot{\vec{r}}_{01}^0 + \left[\dot{\vec{\omega}}_{01}^0 \times\right] C_1^0 \vec{r}_{12}^1 + \left[\vec{\omega}_{01}^0 \times\right]\left[\vec{\omega}_{01}^0 \times\right] C_1^0 \vec{r}_{12}^1 + 2\left[\vec{\omega}_{01}^0 \times\right] C_1^0 \dot{\vec{r}}_{12}^1 + C_1^0 \ddot{\vec{r}}_{12}^1 && (6)
\end{aligned}$$

where

$$\begin{aligned}
\vec{\omega}_{02}^0 &= \dot{\theta} C_2^0 \vec{\rho}^2 = \dot{\theta}\vec{\rho}^0 = \omega_{02}\vec{\rho}^0 = \begin{bmatrix} \omega_{02_x}^0 \\ \omega_{02_y}^0 \\ \omega_{02_z}^0 \end{bmatrix} && (7)\\
\left[\vec{\omega}_{02}^0 \times\right] &= \begin{bmatrix} 0 & -\omega_{02_z}^0 & \omega_{02_y}^0 \\ \omega_{02_z}^0 & 0 & -\omega_{02_x}^0 \\ -\omega_{02_y}^0 & \omega_{02_x}^0 & 0 \end{bmatrix} && (8)
\end{aligned}$$

Relationship Between ECI Frame $\{i\}$ and ECEF Frame $\{e\}$:

$$\begin{aligned}
\vec{0} &= \vec{r}_{ie}^i = \dot{\vec{r}}_{ie}^i = \ddot{\vec{r}}_{ie}^i = \dot{\vec{\omega}}_{ie}^i && (9)\\
\vec{\omega}_{ie}^i &= \begin{bmatrix} 0 \\ 0 \\ \omega_{ie} \end{bmatrix} && (10)\\
C_e^i &= \begin{bmatrix} \cos(\omega_{ie}(t-t_0)) & -\sin(\omega_{ie}(t-t_0)) & 0 \\ \sin(\omega_{ie}(t-t_0)) & \cos(\omega_{ie}(t-t_0)) & 0 \\ 0 & 0 & 1 \end{bmatrix} && (11)
\end{aligned}$$

Relationship between Curvilinear Motion of Locally-level Navigation Frame $\{n\}$ at Geodetic Height h_n above Surface of Ellipsoid and ECEF Frame $\{e\}$:

$$
\begin{aligned}
C_n^e &= \begin{bmatrix} -\sin(L_n)\cos(\lambda_n) & -\sin(\lambda_n) & -\cos(L_n)\cos(\lambda_n) \\ -\sin(L_n)\sin(\lambda_n) & \cos(\lambda_n) & -\cos(L_n)\sin(\lambda_n) \\ \cos(L_n) & 0 & -\sin(L_n) \end{bmatrix} && (12) \\
\vec{r}_{en}^{\,e} &= \begin{bmatrix} x_{en}^e \\ y_{en}^e \\ z_{en}^e \end{bmatrix} = \begin{bmatrix} (R_E + h_n)\cos(L_n)\cos(\lambda_n) \\ (R_E + h_n)\cos(L_n)\sin(\lambda_n) \\ ((1-e^2)R_E + h_n)\sin(L_n) \end{bmatrix} && (13) \\
\dot{\vec{r}}_{en}^{\,e} &= C_n^e \underbrace{\begin{bmatrix} (R_N + h_n)\dot{L}_n \\ (R_E + h_n)\cos(L_n)\dot{\lambda}_n \\ -\dot{h}_n \end{bmatrix}}_{\dot{\vec{r}}_{en}^{\,n}} && (14) \\
\dot{\vec{r}}_{en}^{\,n} &= \begin{bmatrix} v_{en_x}^n \\ v_{en_y}^n \\ v_{en_z}^n \end{bmatrix} = \begin{bmatrix} (R_N + h_n)\dot{L}_n \\ (R_E + h_n)\cos(L_n)\dot{\lambda}_n \\ -\dot{h}_n \end{bmatrix} && (15) \\
\dot{\vec{p}}_n &= \begin{bmatrix} \dot{L}_n \\ \dot{\lambda}_n \\ \dot{h}_n \end{bmatrix} = \begin{bmatrix} \frac{v_{en_x}^n}{R_N + h_n} \\ \frac{v_{en_y}^n}{(R_E + h_n)\cos(L_n)} \\ -v_{en_z}^n \end{bmatrix} && (16)
\end{aligned}
$$

where L_n, λ_n, h_n are geodetic latitude, longitude, and geodetic height of o^n, respectively, and median radius of curvature R_N and transverse radius of curvature R_E are given by

$$
\begin{aligned}
R_N &= \frac{R_0(1-e^2)}{(1-e^2\sin^2(L_n))^{3/2}} && (17) \\
R_E &= \frac{R_0}{\sqrt{1-e^2\sin^2(L_n)}} && (18)
\end{aligned}
$$