ERRATA TO:

***STRAPDOWN ANALYTICS*, SECOND EDITION**

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PARTS 1 AND 2

STRAPDOWN ASSOCIATES, INC. 2007

Corrections Reported From June 2020 To Present

Page 19-23 (Part 2)

Replace the paragraph following (19.1.9-7) with:

From Eq. (19.1.9-7) with $\underline{\alpha}$ and $\underline{\upsilon}$ from (19.1.3-6), it follows that

$$\frac{1}{6}\,\underline{\alpha}\times\Delta\dot{\underline{\phi}}_2 = \frac{1}{6}\,\underline{\alpha}\times\left[\frac{3}{(t - t_{m-1})}\right]\Delta\underline{\phi}_2 + \cdots = -\frac{1}{2}\,\Delta\underline{\phi}_2\times\frac{\underline{\alpha}}{(t - t_{m-1})} + \cdots \approx -\frac{1}{2}\,\Delta\underline{\phi}_2\times\underline{\omega}$$

$$\begin{aligned}\frac{1}{6}\left(\underline{\alpha}\times\Delta\dot{\underline{\eta}}_2 - \Delta\dot{\underline{\phi}}_2\times\underline{\upsilon}\right) &= \frac{1}{6}\left\{\underline{\alpha}\times\left[\frac{3}{(t - t_{m-1})}\,\Delta\underline{\eta}_2\right] - \left[\frac{3}{(t - t_{m-1})}\,\Delta\underline{\phi}_2\right]\times\underline{\upsilon}\right\} + \cdots \\ &= -\frac{1}{2}\left[\Delta\underline{\phi}_2\times\frac{\underline{\upsilon}}{(t - t_{m-1})} - \frac{\underline{\alpha}}{(t - t_{m-1})}\times\Delta\underline{\eta}_2\right] + \cdots \approx -\frac{1}{2}\left(\Delta\underline{\phi}_2\times\underline{a}_{SF} - \underline{\omega}\times\Delta\underline{\eta}_2\right)\end{aligned} \qquad (19.1.9\text{-}7a)$$

On substituting Eqs. (19.1.9-7a) into the $\Delta\dot{\underline{\phi}}_3$ and $\Delta\dot{\underline{\eta}}_3$ expressions in Eqs. (19.1.7-9) - (19.1.7-10), we discover that to Picard third order expansion accuracy, $\frac{1}{6}\,\underline{\alpha}\times\Delta\dot{\underline{\phi}}_2$ cancels $\frac{1}{2}\,\Delta\underline{\phi}_2\times\underline{\omega}$ and $\frac{1}{6}\left(\underline{\alpha}\times\Delta\dot{\underline{\eta}}_2 - \Delta\dot{\underline{\phi}}_2\times\underline{\upsilon}\right)$ cancels $\frac{1}{2}\left(\Delta\underline{\phi}_2\times\underline{a}_{SF} - \underline{\omega}\times\Delta\underline{\eta}_2\right)$, making $\Delta\dot{\underline{\phi}}_3$ and $\Delta\dot{\underline{\eta}}_3$ equal zero. Thus, algorithm errors $\delta\dot{\underline{\phi}}_{Algo/c}$ and $\delta\dot{\underline{\eta}}_{Algo/c}$ in (19.1.9-3) have no third order Picard expansion terms, making the $\dot{\underline{\phi}}_{Algo/c}$ and $\dot{\underline{\eta}}_{Algo/c}$ algorithms in (19.1.8-3) accurate to third order, one order more than (19.1.8-3) might imply.

Corrections Reported From February 2015 To March 2017

Page 19-20 (Part 2)

In Equation (19.1.8-5), the Δ in $\Delta\underline{\eta}_{Algo/c}$ under the integral was omitted. The corrected Equation (19.1.8-5) is as follows:

$$\underline{\zeta}_{Algo/c} = \underline{S}_{\upsilon} + \Delta\underline{\zeta}_{Algo/c} \qquad \Delta\underline{\zeta}_{Algo/c} = \int_{t_{m-1}}^{t} \left[\Delta\underline{\eta}_{Algo/c} + \frac{1}{6}\left(\underline{\alpha} \times \underline{\upsilon} - 2\,\underline{\omega} \times \underline{S}_{\upsilon}\right) \right] dt$$

Corrections Reported From June 2007 To February 2015

Page 15-37 (Part 2)

The first IF statement under the DO loop should be changed to:

IF j is less than or equal to the specified $\Phi_{\lambda y}$ expansion order, THEN:

The indentation for the last two lines in the DO loop should be the same as for the preceding line:

IF j is equal to the specified $\Phi_{\lambda y}$ expansion order: $B = \Phi_{\lambda y}\, \Phi_{\lambda\lambda}^{T}$

$$M_{\lambda\lambda}^{j} = M_{\lambda\lambda}^{j-1}\, \Delta\Phi_{\lambda\lambda_m}$$
$$\Phi_{\lambda\lambda}^{j} = \Phi_{\lambda\lambda}^{j-1} + \frac{1}{j\,!}\, M_{\lambda\lambda}^{j}$$

The indentation of the ENDDO statement should be the same as tor the DO statement.

Page 15-135 (Part 2)

The parameter definition at the bottom of the page should be:

$\Delta\underline{v}_{SF_n}^{N}$ = Equivalent to velocity change produced by specific force acceleration since the start of alignment.

Section 17.2.3 (Part 2)

Sect. 17.2.3 analytically describes how a variation trajectory can be constructed from a reference trajectory to meet specified attitude/position constraints. However, users who have implemented that approach have reported unusual unexplainable performance anomalies. Even though results exactly satisfied the specified attitude/position constraints, the corresponding angular-rate/specific-force/velocity profile contained unexpected sustained high-frequency oscillations triggered by maneuvers. The following references analytically reconstructs the sustained oscillations experienced, and develops an alternate approach for elimination.

Savage, Paul G., "Generating Strapdown Specific-Force/Angular-Rate For Specified Attitude/ Position Variation From A Reference Trajectory", SAI WBN-14026, www.strapdownassociates.com, April 21, 2020.

Savage, Paul G., "Appendices F, G, And H to Generating Strapdown Specific-Force/Angular-Rate For Specified Attitude/ Position Variation From A Reference Trajectory", SAI WBN-14026a, www.strapdownassociates.com, April 21, 2020.