These are errata for the 2011 Edition of the Wiley textbook “Handbook of Marine Craft Hydrodynamics and Motion Control” by T. I. Fossen.

**General Remarks**

**Section 2.4.1 and later** The symbols $\beta$ (no current) and $\beta_r$ (with currents) are both used to denote the sideslip angle. However, it is also common to refer to these angles as the crab angle and sideslip angle, respectively. See http://www.fossen.biz/wiley/OceanCurrentTriangle.pdf


**Page 293, Matlab code** The matrix $H$ should be transposed. Moreover, $K = \text{place}(A',H',p)'$

**Page 400, Before Equation (12.227)** The vector elements should be: $f = [f_1, \ldots, f_n]^\top$


**Page 62, Figure 4.2** The vector for the arm $\overline{GM}T\sin(\phi)$ is hidden behind one layer in the drawing. Should point to the horizontal line starting in $G$ and ending at the vertical line.

**Page 68, Equation (4.48)** Replace $\dot{z}$ with $\dot{w}$.

**Page 72, Equation (4.78)** Replace the moment of inertia $I_x$ with $I_y$.

**Page 86, Equation (5.22)** The second term in the bracket $[\delta\phi, \delta\phi, \delta\psi]$ should read $\delta\theta$.

**Page 89, Equation (5.46)** Delete the incorrect term $-UL\delta\nu$ after the last equal sign. Notice that (5.47) follows directly by time differentiation of (5.43).

**Page 90, Equation (5.55)** Replace the term $-\tilde{A}\xi$ with $-\tilde{A}\xi$.

**Page 96, Equation (5.69)** The last term $... + c_3x_3^3$ should not have a subscript. Moreover, it should read $... + c_3x^3$.

**Page 114, Equation (6.20)** Replace $\dot{z}$ with $\dot{w}$. 


Page 124, Equations (6.74)–(6.75) should read
\[ T = \frac{T_n}{2\pi\zeta} \] 
Hence, (6.75) becomes \(159.2 \text{ s} \leq T \leq 238.8 \text{ s} \).

Page 133, Equation (6.115) The \(L\) matrix is only correct for linearization between BODY and SEAKEEPING. For linearization between BODY and NED, the correct expression for (6.115) is given by (7.39). This only affects \(C_A^*\).

Page 153, Figure 7.5 The arrow showing \(\psi\) should start from the dotted line indicating the North direction and not the body axes.

Page 174, Equation (7.213) There is one zero to much in the expression for \(G\). Should read:
\[ G = \text{diag}\{0, 0, 0, (z_g - z_b)W, (z_g - z_b)W, 0\} \]

Page 174, Equation (7.214) The last column vector only has five zeros. It should be six zeros.

Page 186, Equation (7.272) The second line in the damping matrix should replace \(M_v, M_p, M_r\) with \(K_v, K_p, K_r\).

Page 212, Equations (8.83)–(8.84) The vector arguments \(\eta\) has replaced \(\tau\). Should read:
\[ \tau_{\text{wave1}} = \left[ \tau^{(1)}_{\text{wave1}}, \tau^{(2)}_{\text{wave1}}, \tau^{(3)}_{\text{wave1}}, \tau^{(4)}_{\text{wave1}}, \tau^{(5)}_{\text{wave1}}, \tau^{(6)}_{\text{wave1}} \right]^\top \]
\[ \tau_{\text{wave2}} = \left[ \tau^{(1)}_{\text{wave2}}, \tau^{(2)}_{\text{wave2}}, \tau^{(3)}_{\text{wave2}}, \tau^{(4)}_{\text{wave2}}, \tau^{(5)}_{\text{wave2}}, \tau^{(6)}_{\text{wave2}} \right]^\top \]

Page 299, Equation (11.57) The expression for the predictor should be corrected to:
\[ \bar{x}(k + 1) = \hat{x}(k) + hf(\hat{x}(k), u(k)) \]

Page 300, Methods A and B The predictor line in the pseudo code should read: \(\bar{x}(k + 1) = \hat{x}(k) + hf(\hat{x}(k), u(k))\)

Page 329, Figure 11.17. The gravity terms \(g^n\) should be positive and not negative.

Page 330, Equation (11.219) The accelerometer reads \(-1 \text{ g}\) (acceleration upwards) when stationary. Hence, the sign of the acceleration should be corrected such that:
\[ a^b_{imu} = R_n^b(\Theta)(\hat{v}_{m/n}^n - g^n) + b^b_{acc} + w^b_{acc} \]
This error is propagated to Equations (11.230), (11.233), (11.237), (11.256) and (11.263) which all should multiply \(g^n\) with \(-1\).
Page 337, Equations (11.264)–(11.266) The sign of $g^n$ in (11.264) should be corrected such that $a_{imu}^b = -R_n^b(\Theta)g^n$. Hence, (11.265)–(11.266) should read:

$$
\begin{bmatrix}
a_x \\
a_y \\
a_z
\end{bmatrix}
\approx
\begin{bmatrix}
g \sin(\theta) \\
-g \cos(\theta) \sin(\phi) \\
-g \cos(\theta) \cos(\phi)
\end{bmatrix}
$$

Page 337, Equation (11.267) Should read (only the expression for $a_x/g$ is sign corrected):

$$
\frac{a_y}{a_z} \approx \tan(\phi), \quad \frac{a_x}{g} \approx \sin(\theta), \quad \frac{a_y^2 + a_z^2}{g^2} \approx \cos^2(\theta)
$$

Page 338, Equation (11.275), Figure 11.18 The $q$ and $\dot{q}$ arguments in the rotation matrices have switched places. Should read:

$$
\dot{q} = T_q(\dot{q}) R_n^b(\dot{q})^\top R_n^b(q) \left[ \omega_{imu}^b - \hat{b}_{kyro}^b + K_p \varepsilon \text{sgn}(\tilde{\eta}) \right]
$$

The same is the case for the expression in Figure 11.18.

Page 339, Text below Equation (11.287) Barabalat’s lemma gives convergence of $\varepsilon$ to zero. Uniform observability gives exponentially stability since ULAS = ULES in a linear system $\dot{x} = A(t)x$. The results are, however, not global since the quaternions have two equilibria (topological limitation).

Page 341, Figure 11.19 The gain $\frac{1}{2}K_i$ should be multiplied with $-1$ as in Formula (11.302).

Page 342 The components $m_x, m_y, m_z$ in (11.306) and (11.308) should be $m_x^b, m_y^b, m_z^b$ and $m_x^n, m_y^n, m_z^n$, respectively since these vectors are in BODY and NED.

Page 420, Equation below (13.15) The matrix elements $-d/m$ and $-k/m$ should change places.

Page 383, Equation (12.145). The term $T_d s$ in the numerator on the second line should be replaced by $T_i s$.

Page 467, Equation 13.297. The sign in front of $\frac{\partial a_1}{\partial t_1}$ should be positive and not negative.

Page 527, Equation (13.617) The kinematic equation is based on (2.45) on page 27. Hence, (13.617) should read:

$$
\dot{\theta} = q \cos(\phi) - r \sin(\phi) \approx q
$$

Page 547, Equation (B.47) The first line misses the sampling time $h$. Should read:

$$
x_1 = h f(x(k), u(k), t_k)
$$
The variables defined below (B.50) should be $a = -1/T, b = 1/T, c = -1$ and $d = 1$. Consequently, the discrete-time model (B.51)–(B.52) has two sign errors:

$$y(k) = -x(k) + u(k)$$

$$- (\exp(-h/T) - 1)u(k)$$