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Correction

Correction: Tang, C. Y. and Chen, X.Y. A Class of Coning Algorithms Based on a Half-Compressed Structure. *Sensors* 2014, *14*, 14289–14301

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1. Change in Tables/Equations

Due to an oversight by MDPI and the authors, the following numerical corrections were not made in the originally published article [1]. MDPI-Sensors and the authors would like to apologize for any inconvenience brought to the readers.

The authors wish to make the following correction to the article [1]:

The former Table 9 (labelled here as Old Table 9) and Table 10 (labelled here as Old Table 10) should be replaced by the new versions shown below (labelled here as New Table 9 and New Table 10), respectively. The *z* s in Tables 15 and 16 and the maneuver errors in [1] Table 17 will not be affected by the correction to Tables 9 and 10, because these *z* s and the maneuver errors were all calculated using the correct coefficients in New Tables 9 and 10. That means, the mistakes in Old Tables 9 and 10 are just writing errors.

Old Table 9. FTSuc algorithm coefficients.

L	*N*	**Coefficients**
3	3	$\varsigma_{12} = \varsigma_{23} = 27/40$, $\varsigma_{13} = 9/20$
4	4	$\varsigma_{12} = \varsigma_{34} = 232/315$, $\varsigma_{23} = 178/315$, $\varsigma_{13} = \varsigma_{24} = 46/105$, $\varsigma_{14} = 54/105$
5	5	$\varsigma_{12} = 18575/24192$, $\varsigma_{13} = 2675/6048$, $\varsigma_{14} = 11{,}225/24{,}192$, $\varsigma_{15} = 125/252$, $\varsigma_{23} = 2575/6048$, $\varsigma_{24} = 425/672$, $\varsigma_{25} = 139{,}75/24{,}192$, $\varsigma_{34} = 1975/3024$, $\varsigma_{35} = 325/1512$, $\varsigma_{45} = 21{,}325/24{,}192$

New Table 9. FTSuc algorithm coefficients.

L	*N*	**Coefficients**
3	3	$\varsigma_{12} = \varsigma_{23} = 27/40$, $\varsigma_{13} = 9/20$
4	4	$\varsigma_{12} = \varsigma_{34} = 232/315$, $\varsigma_{23} = 178/315$, $\varsigma_{13} = \varsigma_{24} = 46/105$, $\varsigma_{14} = 54/105$
5	5	$\varsigma_{12} = 21325/24192$, $\varsigma_{13} = 325/1512$, $\varsigma_{14} = 13975/24192$, $\varsigma_{15} = 125/252$, $\varsigma_{23} = 1975/3024$, $\varsigma_{24} = 425/672$, $\varsigma_{25} = 11225/24192$, $\varsigma_{34} = 2575/6048$, $\varsigma_{35} = 2675/6048$, $\varsigma_{45} = 18575/24192$

Old Table 10. LMSuc algorithm coefficients.

L	*N*	**Coefficients**
3	3	$\varsigma_{12} = 0.681306$, $\varsigma_{13} = 0.444312$, $\varsigma_{23} = 0.679452$
4	4	$\varsigma_{12} = 0.739716$, $\varsigma_{13} = 0.432467$, $\varsigma_{14} = 516734$, $\varsigma_{23} = 0.571812$, $\varsigma_{24} = 0.4434453$, $\varsigma_{34} = 0.737795$
5	5	$\varsigma_{12} = 769{,}240$, $\varsigma_{13} = 0.438591$, $\varsigma_{14} = 0.467191$, $\varsigma_{15} = 0.495116$, $\varsigma_{23} = 0.431753$, $\varsigma_{24} = 0.625867$, $\varsigma_{25} = 0.579681$, $\varsigma_{34} = 0.656805$, $\varsigma_{35} = 0.213527$, $\varsigma_{45} = 0.881820$

New Table 10. LMSuc algorithm coefficients.

L	*N*	**Coefficients**
3	3	$\varsigma_{12} = 0.679452$, $\varsigma_{13} = 0.444312$, $\varsigma_{23} = 0.681306$
4	4	$\varsigma_{12} = 0.737795$, $\varsigma_{13} = 0.434453$, $\varsigma_{14} = 516734$, $\varsigma_{23} = 0.571812$, $\varsigma_{24} = 0.432467$, $\varsigma_{34} = 0.739716$
5	5	$\varsigma_{12} = 0.881820$, $\varsigma_{13} = 0.213527$, $\varsigma_{14} = 0.579681$, $\varsigma_{15} = 0.495116$, $\varsigma_{23} = 0.656805$, $\varsigma_{24} = 0.625867$, $\varsigma_{25} = 0.467191$, $\varsigma_{34} = 0.431753$, $\varsigma_{35} = 0.438591$, $\varsigma_{45} = 0.769240$

The former Equation (12) of [1]:

$$G\Gamma(t_{l-1}) = \bar{G}, G \equiv (g_i)_{M\times1}, \bar{G} \equiv (\bar{g}_j)_{M\times1}, \Gamma(t_{l-1}) \equiv (\gamma_{ji}(t_{l-1}))_{M\times M}$$

$$\gamma_{ji}(t_{l-1}) = \begin{cases} (-t_{l-1})^{i-j} & , \ j=1 \\ (-t_{l-1})^{i-j}(i-1)!/(j-1)!, 1<j\le i \\ 0 & , \ j>i \end{cases} \quad (12)$$

Should be replaced by the new Equation (12):

$$G\Gamma(t_{l-1}) = \bar{G}, G \equiv (g_i)_{M\times1}, \bar{G} \equiv (\bar{g}_j)_{M\times1}, \Gamma(t_{l-1}) \equiv (\gamma_{ji}(t_{l-1}))_{M\times M}$$

$$\gamma_{ji}(t_{l-1}) = \begin{cases} (-t_{l-1})^{i-j} & , \ j=1 \\ (-t_{l-1})^{i-j}(i-1)!/((i-j)!(j-1)!), 1<j\le i \\ 0 & , \ j>i \end{cases} \quad (12)$$

Affected by the correction to Equation (12), the former Table 17 (labelled here as Old Table 17) of [1] should be replaced by the new version (labelled here as New Table 17). The correction to Table 17 will not affect the conclusions of [1].

Old Table 17. Maximum maneuver error over 2 s maneuver.

L	***N***	**Maximum Maneuver Error, μ Rad**					
		FTSc	**LMSc**	**FTShc**	**LMShc**	**FTSuc**	**LMSuc**
3	3	1.00e–2	−1.88e–2	−3.34e–3	3.65e–3	2.86e–6	−2.52e–2
4	4	3.24e–2	3.25e–2	−5.51e–3	−5.54e–3	1.48e–12	9.66e–4
5	5	7.32e–2	7.33e–2	−7.50e–3	−7.52e–3	−7.23e–13	3.25e–5

New Table 17. Maximum maneuver error over 2 s maneuver.

L	***N***	**Maximum Maneuver Error, μ rad**					
		FTSc	**LMSc**	**FTShc**	**LMShc**	**FTSuc**	**LMSuc**
3	3	−1.09e–2	−7.29e–3	3.63e–3	7.48e–3	1.39e–6	3.66e–3
4	4	−3.52e–2	−3.54e–2	5.98e–3	5.89e–3	1.67e–12	−1.40e–4
5	5	−7.97e–2	−7.97e–2	8.15e–3	8.17e–3	−3.09e–13	−4.73e–6

2. Change in Main Body Paragraphs

Due to an obscurity on how Equations (13) and (14) of [1] were built, the authors wish to insert some additional sentences to explain how Equations (13) and (14) of [1] can be converted from Equations (59) and (13) of Song (reference [9] of [1]).

Below we respectively denote the Song ς_{ij} and the [1] ς_{ij} using $(\varsigma_{ij})_S$ and $(\varsigma_{ij})_T$.

After setting $p = N + 1 - i$ and $q = N + 1 - j$, we can rewrite Equation (5) of Song [9] as:

$$\delta\hat{\phi}_{unc}(t) = \sum_{p=1}^{N-1}\sum_{q=p+1}^{N}\left(\varsigma_{N+1-p,N+1-q}\right)_S \Delta\alpha_p \times \Delta\alpha_q \quad \text{(a1)}$$

If $\delta\hat{\phi}_{unc}(t)$ and $\left(\varsigma_{N+1-p,N+1-q}\right)_S$ are respectively denoted by $\delta\hat{\phi}_l$ and ξ_{pq}, Equation (a1) can be rewritten as:

$$\delta\hat{\phi}_l = \sum_{p=1}^{N-1}\sum_{q=p+1}^{N}\xi_{pq}\Delta\alpha_p \times \Delta\alpha_q \quad \text{(a1)}$$

Comparing Equation (a2) with the [1] Equation (3), we will find that both equations are the same expression under $\xi_{pq} = (\varsigma_{ij})_T$ with $p = i$ and $q = j$.

Thus, to make Song [9] Equation (5) of and [1] Equation (3) equivalent will achieve $\left(\varsigma_{ij}\right)_T = \left(\varsigma_{N+1-i,N+1-j}\right)_S$. Using this relationship, we have respectively converted ς_{ij} s in Tables 1 and 2 of Song [9] to ς_{ij} s in New Tables 9 and 10, also we can convert Song [9] Equation (13) to [1] Equation (14), when Song [9] n is replaced by L.

Now we rewrite Song [9] Equation (59) as:

$$\delta\hat{\phi}_{unc}-\delta\phi_c = z_3^{'}\omega(t_{m-1})\times\dot{\omega}(t_{m-1})\left(t-t_{m-1}\right)^3 + z_4^{'}\omega(t_{m-1})\times\ddot{\omega}(t_{m-1})\left(t-t_{m-1}\right)^4$$
$$+\left(z_{51}^{'}\omega(t_{m-1})\times\dddot{\omega}(t_{m-1}) + z_{52}^{'}\dot{\omega}(t_{m-1})\times\ddot{\omega}(t_{m-1})\right)\left(t-t_{m-1}\right)^5$$
$$+\left(z_{61}^{'}\omega(t_{m-1})\times\ddddot{\omega}(t_{m-1}) + z_{62}^{'}\dot{\omega}(t_{m-1})\times\dddot{\omega}(t_{m-1})\right)\left(t-t_{m-1}\right)^6$$
$$+\left(z_{71}^{'}\omega(t_{m-1})\times\overset{....}{\dot{\omega}}(t_{m-1}) + z_{72}^{'}\dot{\omega}(t_{m-1})\times\ddddot{\omega}(t_{m-1}) + z_{73}^{'}\ddot{\omega}(t_{m-1})\times\dddot{\omega}(t_{m-1})\right)\left(t-t_{m-1}\right)^7$$
$$+\mathrm{o}\left(\left(t-t_{m-1}\right)^9\right)$$

$$z_3^{'}=\frac{1}{6}\left(f_3-\frac{1}{2}\right), z_4^{'}=\frac{1}{24}\left(f_4-1\right), z_{51}^{'}=\frac{1}{120}\left(f_{51}-\frac{3}{2}\right), z_{52}^{'}=\frac{1}{120}\left(f_{52}-1\right), z_{61}^{'}=\frac{1}{720}\left(f_{61}-2\right)$$
$$z_{62}^{'}=\frac{1}{720}\left(f_{62}-\frac{5}{2}\right), z_{71}^{'}=\frac{1}{5040}\left(f_{71}-\frac{5}{2}\right), z_{72}^{'}=\frac{1}{5040}\left(f_{72}-\frac{9}{2}\right), z_{73}^{'}=\frac{1}{5040}\left(f_{73}-\frac{5}{2}\right) \quad \text{(a3)}$$

where f s are of Song [9], rather than of [1].

Set:

$$g_i=\frac{d^{i-1}}{dt^{i-1}}\left(\omega(t)\big|_{t=t_{m-1}}\right)\Big/(i-1)!,\ i=1,2,... \quad \text{(a4)}$$

where i is a positive integer, and $\frac{d^0}{dt^0}\left(\omega(t)\big|_{t=t_{m-1}}\right)$ denotes $\omega(t_{m-1})$.

Then Equation (a3) can be converted into [1] Equation (13), when $\delta\hat{\phi}_{unc}(t)-\delta\phi_c(t)$, t_{m-1} and n are respectively replaced by $\delta\hat{\phi}_l-\delta\phi_l$, t_{l-1} and L.

To confirm the correctness of [1] Equations (13) and (14), the z s in [1] Equation (13) are calculated for LMSuc using the [1] f s (see [1] Equation (14)) and ς s in New Table 10. Also the $z^{'}$ s in Equation (a3) are calculated for UncExp using the Song [9] f s (see Song [9] Equations (13)) and ς s in Song [9] Table 1. The z s for LMSuc and the $z^{'}$ s for UncExp are listed in Tables a1 (the copy of [1] Table 16) and a2, respectively.

Table a1. The z s for [1] LMSuc.

L	*N*	z_3	z_4	z_{51}	z_{52}	z_{61}	z_{62}	z_{71}	z_{72}	z_{73}
3	3	−2.29e–5	0	−9.12e–4	−2.56e–4	−1.83e–3	−8.46e–4	−2.57e–3	−1.48e–3	−5.53e − 4
4	4	4.95e–7	−1.30e–8	−2.00e–8	−1.04e–6	1.32e–7	−1.02e–8	−6.17e–5	−7.30e–5	−2.84e–5
5	5	1.07e–8	1.07e–9	2.24e–9	2.21e–8	3.03e–9	1.55e–9	−3.49e–5	2.08e–9	3.45e–6

Table a2. The $z^{'}$ s for Song [9] UncExp.

n	*N*	$z_3^{'}$	$z_4^{'}$	$z_{51}^{'}$	$z_{52}^{'}$	$z_{61}^{'}$	$z_{62}^{'}$	$z_{71}^{'}$	$z_{72}^{'}$	$z_{73}^{'}$
3	3	−2.29e–5	0	−1.52e–4	−1.28e–4	−7.63e–5	−1.41e–4	−2.15e–5	−6.18e–5	−4.61e–5
4	4	4.95e–7	−6.51e–9	−3.34e–9	−5.21e–7	5.49e–9	−1.70e–9	−5.14e–7	−3.04e–6	−2.37e–6
5	5	1.07e–8	5.33e–10	3.73e–10	1.10e–8	1.26e–10	2.58e–10	−2.91e–7	8.67e–11	2.87e–7

Comparing the $z_3^{'}$,$z_4^{'}$, $z_{51}^{'}$ and $z_{52}^{'}$ in Table a2 with those in Equations (65)–(67) of Song [9], we can find that the former is consistent with the later except for $z_4^{'}$ and $z_{51}^{'}$. (The $z_4^{'}$ and $z_{51}^{'}$ in Equations (66) and (67) of Song [9] are zero, while the $z_4^{'}$ and $z_{51}^{'}$ in Table a2 for UncExp4 and UncExp5 are near zero. The difference between z_4' and z_{51}' of Table a2 and those of Song [9] is due to round-off (to six places) in the Song [9] ς s used in [1].) This has been confirmed independently by a Reviewer of [1] that found identical results when using Song [9] equations and Song rounded ς s.

The authors wish to express their appreciation to a reviewer of [1] for his insightful comments and constructive suggestions used in the original article, also for his valuable suggestions used in this correction.

References

1. Tang, C.Y.; Chen, X.Y. A Class of Coning Algorithms Based on a Half-Compressed Structure. *Sensors* **2014**, *14*, 14289–14301.