Dr. habil. Christian B. U. Perwaß

Errata for Geometric Algebra with Applications in Engineering

February 2, 2010

Springer

Despite the efforts I had taken to ensure that the book is error free, a couple of mistakes were left in the text. In the following, the mistakes and their corrections are listed in the order they appear in the text. I would like to thank all the attentive readers that pointed me to the erroneous passages.

Section 3.2.6.2, page 71

The statement "*Note that for a non-null-blade* $\boldsymbol{A}_{\langle k\rangle} \in \mathbb{G}^{\varnothing\, k}_{p,q}$, $\boldsymbol{A}^{\dagger}_{\langle k\rangle} = \widetilde{\boldsymbol{A}}_{\langle k\rangle}$ *and thus [...]*" is incorrect. Instead it should read "*[...] for a blade* $\boldsymbol{A}_{\langle k\rangle} \in \mathbb{G}^{k}_{p}$, $\boldsymbol{A}^{\dagger}_{\langle k\rangle} = \widetilde{\boldsymbol{A}}_{\langle k\rangle}$ *and thus [...]*". Similarly, equation (3.65) is only true if $\boldsymbol{A}_{\langle k\rangle} \in \mathbb{G}^{k}_{p}$.

Section 3.2.7.2, page 74

The statement above equation (3.74) should read "*Here is another* **example** *of equation (3.71)*".

Lemma 3.14, page 76

The penultimate sentence of the proof should be "*Hence,* $\boldsymbol{E}_i \cdot \boldsymbol{I} = \langle \boldsymbol{E}_i\, \boldsymbol{I}\rangle_{|k-(p+q)|} = \boldsymbol{E}_i \cdot \boldsymbol{I}$ *for all* i.".

Section 4.3.12, page 171

The statement "*Let* $\boldsymbol{S}_1, \boldsymbol{S}_2 \in \mathbb{G}^{1}_{4,1}$ *be outer-product representations [...]*" should read "*Let* $\boldsymbol{S}_1, \boldsymbol{S}_2 \in \mathbb{G}^{1}_{4,1}$ *be* **inner**-*product representations [...]*".

Section 4.3.13, page 173

In Table 4.5 the number of elements of a general dilator is 5 and not 2.

Section 5.2.2, page 205

The discussion following equation (5.35) is only correct in general if blades $\boldsymbol{A}, \boldsymbol{B} \in \mathbb{G}_n$ with $1 \leq n \leq 3$. If $n > 3$ then $\boldsymbol{V}\, \boldsymbol{A}\, \boldsymbol{V}^{-1} - \boldsymbol{B}$ need not result in a blade.

Section 5.3.3.1, page 213

In equation (5.62) the Symbol ${G^k}_{ij}$ has to be replaced by ${\Gamma^k}_{ij}$.

Section 5.4.2, page 220

In equation (5.84) the Symbols ${G^r}_{ij}$ and ${G^s}_{ij}$ have to be replaced by ${\Gamma^r}_{ij}$ and ${\Gamma^s}_{ij}$, respectively.

Section 6.1.3.2, page 262

In the description to Figure 6.8(b) $\boldsymbol{L}'$ has to be replaced by $\boldsymbol{H}$.

Section 10.3.3, page 363

It seems I should have added an additional step in the derivation of the relation between the correlation coefficient and the magnitude of a blade of random variables, to avoid confusion. Here is the missing step starting just behind the second equation of this section:

Thus,

$$0 \leq \|\check{\underline{X}} \wedge \check{\underline{Y}}\|^2 \leq \mathcal{V}(\check{\underline{X}})\, \mathcal{V}(\check{\underline{Y}})\,.$$

If $\mathcal{V}(\check{\underline{X}}) > 0$ and $\mathcal{V}(\check{\underline{Y}}) > 0$, it follows that

$$0 \leq \frac{\|\check{\underline{X}} \wedge \check{\underline{Y}}\|^2}{\mathcal{V}(\check{\underline{X}})\, \mathcal{V}(\check{\underline{Y}})} \leq 1 \qquad \Longleftrightarrow \qquad 0 \leq 1 - \frac{\mathcal{C}(\check{\underline{X}}, \check{\underline{Y}})^2}{\mathcal{V}(\check{\underline{X}})\, \mathcal{V}(\check{\underline{Y}})} \leq 1$$

Furthermore, multiplying by -1 and adding 1 results in

$$0 \leq \frac{\mathcal{C}(\check{\underline{X}}, \check{\underline{Y}})^2}{\mathcal{V}(\check{\underline{X}})\, \mathcal{V}(\check{\underline{Y}})} \leq 1\,.$$

This ratio describes [...] defined as

$$\rho(\underline{X}, \underline{Y}) := \frac{\mathcal{C}(\underline{X}, \underline{Y})}{\sqrt{\mathcal{V}(\underline{X})\, \mathcal{V}(\underline{Y})}}\,.$$

The relation between the correlation coefficient and the magnitude of the blade of random variables is therefore

$$1 - \rho(\underline{X}, \underline{Y})^2 = \frac{\|\check{\underline{X}} \wedge \check{\underline{Y}}\|^2}{\mathcal{V}(\check{\underline{X}})\, \mathcal{V}(\check{\underline{Y}})}\,.$$