Introduction to Computational Stochastic PDEs, CUP, 2014

Here are the typos/errors that we know about in the first edition. Detailed corrections to MATLAB codes are given on-line. Let us know if you find anymore.
September 23, 2017.

Chapter 1. **p17** In Definition 1.60, the Hilbert–Schmidt norm should be defined as

$$\|L\|_{\mathrm{HS}(U,H)} := \left(\sum_{j=1}^{\infty} \|L\phi_j\|^2\right)^{1/2},$$

(the norm on the right is the one in H not in U).

p21 Lemma 1.78 (Dini's lemma) requires additionally the assumption that f is continuous (to guarantee that $f(\boldsymbol{x}) - f_n(\boldsymbol{x}) \geq \epsilon$ for the limit point $\boldsymbol{x}$). In the application of Dini's lemma for the proof of Theorem 1.80 (Mercer's theorem), this holds true for $g(\boldsymbol{x}) = G(\boldsymbol{x}, \boldsymbol{x})$.

Chapter 2. **p42** Figure 2.1 is misprinted.

p56 In the first displayed equation of the proof, the first term in the integrand should be $p(x)(e(x)')^2$ (the $e(x)$ has one too many dashes).

p79 The right-hand side of (2.109) should be $c_1|\hat{u} - I_h\hat{u}|^2_{H^2(\triangle_*)}$.

Assumption 2.64 in general can only be verified for constant boundary data g; H^2-regularity results usually include an extra term on the right-hands side to account for $g \neq 0$ — see (Renardy and Rogers, 2004, Theorem 8.53) or (McLean, 2000, Theorem 4.10).

Chapter 3. **p116** `meshgrid` is misused in Example 3.40 and Algorithm 3.6. See `exa_3.40.m`.

p132 Following the comment on p487 below, the last line of the proof should be

$$\|u(t_n) - \tilde{u}_n\| \leq E\exp(Ln\Delta t).$$

Chapter 4. **p159** Nensen's inequality ↦ Jensen's inequality (in proof of T4.58 (iii)).

p179 Bayes' theorem is due to the Reverend Thomas Bayes and the apostrophe is written after and not, as in Exercise 4.11, before the s. In the same exercise, $p_{X,Y}$ is incorrectly defined and it should be

$$\mathbb{P}(X = x_k, Y = y_j) = P_{X,Y}(k, j)$$

(interchange j and k).

Chapter 5. **p185** In the second displayed equation on the left-hand side, delete the comma.

Chapter 6. **p291** In Algorithm 7.10 (`turn_band_wm.m`), f should be an even function of s (missing modulus).

Chapter 7.

Chapter 8.

Chapter 9.

Chapter 10. **p442–469** `meshgrid` is misused in Examples 10.12 and 10.40 and in Algorithms 10.5 and 10.10. See `exa_10.40.m`.

Appendix.

p487 The discrete Gronwall inequality (Lemma A.14) is incorrect. It should either be

Lemma. *Consider $z_n \geq 0$ such that $z_n \leq a + bz_{n-1}$ for $n = 1, 2, \ldots$ and $a, b \geq 0$. If $b = 1$, then $z_n \leq z_0 + na$. If $b \neq 1$, then*

$$z_n \leq b^n z_0 + \frac{a}{1-b}(1 - b^n).$$

or

Lemma. *Consider* $z_n \geq 0$ *such that*

$$z_n \leq a + b \sum_{k=0}^{n-1} z_k, \quad \textit{for } n = 0, 1, 2, \ldots \tag{*}$$

and constants $a, b \geq 0$. *Then,* $z_n \leq a(1+b)^n \leq a \exp(bn)$.

The first lemma is (Stuart and Humphries, 1997, Theorem 1.1.12).

To prove the second lemma, notice it is true for $n = 0$. Assume it is true for $z_0, \ldots, z_{n-1}$. Then,

$$\begin{aligned} z_n &\leq a + b \sum_{k=0}^{n-1} z_k \quad \text{by } (*) \\ &\leq a + b \sum_{k=0}^{n-1} a(1+b)^k \quad \text{by the induction assumption} \\ &= a + ab \frac{1-(1+b)^n}{1-(1+b)} \quad \text{by the geometric sum formula} \\ &= a + ab \frac{1-(1+b)^n}{-b} = a + a((1+b)^n - 1) = a(1+b)^n. \end{aligned}$$

Therefore, $z_n \leq a(1+b)^n$ for all $n = 0, 1, 2, \ldots$ by induction. Finally, $z_n \leq a \exp(bn)$ as $1 + x \leq \exp(x)$ for $x \geq 0$. The second lemma can be used in the proof of Theorems 3.55 and 10.34.