

# Erratum

## 1 Chapter 3

1. Algorithm 22:

$$L_N \leftarrow \frac{2k-1}{k} x L_{N-1}(x) - \frac{k-1}{k} L_{N-2}$$

should read

$$L_N \leftarrow \frac{2k-1}{k} x L_{N-1} - \frac{k-1}{k} L_{N-2}.$$

(Thanks to Travis Johnson)

## 2 Chapter 4

1. Equation (4.6) should be  $\varphi_x$  in the boundary term. Should be

$$\int_0^L \varphi_t \phi dx = \int_0^L (v\varphi_x)_x \phi dx = v\varphi_x \phi|_0^L - \int_0^L v\varphi_x \phi_x dx.$$

2. After (4.14)  $x_n = 2\pi n/N$ . The  $n$  is missing on the right in the text.
3. Equation (4.39) is missing the  $v$ . Should be

$$\dot{\hat{\Phi}}_k = -(ik + vk^2)\hat{\Phi}_k, \quad k = -N/2, \dots, N/2.$$

4. After (4.141), the statement about integrate by parts once or twice is incorrect. New results show they are actually identical for either quadrature. See D.A. Kopriva and G. Gassner “On the Quadrature and Weak Form Choices in Collocation Type Discontinuous Galerkin Spectral Element Methods”, J. Sci. Comput. (doi:[10.1007/s10915-010-9372-3](https://doi.org/10.1007/s10915-010-9372-3)).
5. Equation (4.82) should be

$$\varphi(x, t) = \sin[\pi(x+1)]e^{-\pi^2 t}.$$

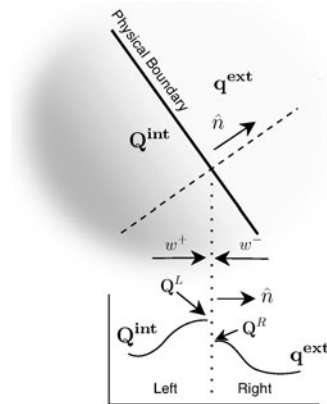
(Thanks to Travis Johnson)

6. In Algorithm 60, p. 139, the procedure should be called “DGDerivative”, not “ComputeDGDerivative”.
7. Page 127, Algorithm 53 should have  $\Phi \leftarrow 0$  instead of  $U \leftarrow 0$ . (Thanks to Travis Johnson)
8. Page 133, Algorithm 57’s summand in the inner loop should be  $D_{k,n} D_{k,j} w_k$  to be consistent with (4.123). (Thanks to Travis Johnson)

### 3 Chapter 5

1. Algorithm 87 needs  $t$ ,  $N_{it}$ ,  $TOL$  as an input.
2. Benchmark 5.3.5  $\Delta t = 5.0 \times 10^{-3}$ .
3. Figure 5.8:  $w$  is missing the “-” superscript on the right of the boundary. It should be as shown in Fig. 1 below.

**Fig. 1** Interior and exterior states at a boundary viewed along the normal direction



### 4 Chapter 6

1. In (6.79), the spatial derivative has been moved to the right hand side. Needs a minus sign. Should be

$$\dot{\Phi}_{i,j} = -\frac{1}{J} \left\{ \frac{\partial}{\partial \xi} I_N [(Y_\eta - X_\eta)\Phi] + \frac{\partial}{\partial \eta} I_N [(-Y_\xi + X_\xi)\Phi] \right\}_{i,j}.$$

### 5 Chapter 8

1. In Algorithm 129, the next to the last line should read `mesh.Construct(this.spA, meshFile)`

### 6 Appendix E

1. In Algorithm 147, Procedure “GetDataForKeys” should be “DataForKeys”.