Parallel Scientific Computing in C++ and MPI

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Corrections to First Edition, CUP

1. p. 55, top: the last entry in $\mathbf{q}_1$ should be -0.22890.

2. p. 79, bottom: The MPI_Init in the code example should be: MPI_Init(&argc,&argv).

3. p. 105, bottom: change "i" to "k" in $i = 0, \ldots, N$.

4. p. 110 in the "Properties of Chebyshev Polynomials":

   a. Under "Zeroes" Bullet: "The roots of its derivative ..." should be the following: "The roots of the function $q(x) = (1 - x^2)T_n'(x)$, which are the locations of the extrema for $T_n(x)$, are the *Gauss-Lobatto points* and are given by $x_k' = \cos\frac{k\pi}{n}, k = 0, 1, \ldots, n$.

   b. Under "Orthogonality" Bullet: Last line of last equation should read i=j=0. After equation, a line should be inserted which says: "where x_k are the Chebyshev-Gauss points, and where both i and j are less than or equal to m".

5. p. 112, top: In the definition of $f(x)$ need to change the subscript of $T(x)$ to k.

6. p. 119, top: The expression

$$\frac{\partial R}{\partial a_i} = 0 \quad \text{for} \quad i = 1, \ldots, n.$$

   should read

$$\frac{\partial R}{\partial a_i} = 0 \quad \text{for} \quad i = 0, \ldots, n.$$

7. p. 126, Table 3.1: The first four entries in the table should be modified so that: `++i` is Pre-increment, `i++` is Post-increment, `--i` is Pre-decrement, and `i--` is Post-decrement. Also note that decrement is two successive minus signs `i--`, not a single long minus sign.

8. p. 182, first line: Replace "... we will building ..." with "... we will be building...".

9. p. 183, HW 11: "Determine a spline of variable degree...", instead of "Determine a B-spline...".

10. p. 183, HW 12: Replace "... points 0,1,2,3,4." with "...points $x = 0, 1, 2, 3, 4$.

11. p. 207, top-middle: Change ϵ to e after "Let us now assume that ...".

12. p. 212, algorithm: Begin loop from $n = 0$ not 1. Also, the last statement within the loop should be: $\mathbf{f}_{n+1} = \mathbf{A}\mathbf{x}_{n+1} - \mathbf{b}$.

13. p. 216, algorithm: Begin loop from $k = 0$ not 1.

14. p. 216, bottom: Replace "...one dot product, and three daxpy ..." with "...two dot products, and three daxpy ...".

15. p. 228, middle: Setting the moments to zero equates to:

$$\int_{-1}^{1} F_n(x) x^k dx = 0, \quad k = 0, 1, \ldots, m-1$$

16. p. 234, middle: Sentence should read "Using the trapezoid rule with nine...".

17. p. 235, equation after "The result is" should be

$$I_G = \sum_{k=1}^{5} y_k w_k = 164.794290$$

(Note the missing "$k =$" in the sum and the change of value on the RHS).

18. p. 273 The first two lines of the comment section just above the "REMARKS" should be changed to read:

```
// At this point, process1 has in its recvbuffer the contents
// of process2's sendbuffer, process2 has in its recvbuffer
```

19. p. 322, top and bottom matrices: should have the "0" better placed.

20. p. 327: The top matrix equation should have the x-vector aligned with the rows of the matrix. Also, the zeros should be better placed. The same for the matrices just below.

21. p. 328, Thomas algorithm code: The line

```
q2[0] = -b[N-1];
```

should be

```
q2[0] = -b[0];
```

22. p. 329: Top matrices should have the zeros better placed.

23. p. 376: Final bullet before MPI_Allgather – Replace "... at least the value of ..." with "... at least the byte size of".

24. p. 377: Final bullet within the REMARKS section – Replace "... to the value of .." with "... to the byte size of ...".

25. p. 385, top: the diagram with the solid squares representing entries on the matrix needs fixing, especially the two middle blocks.

26. p. 388, SOR code: The lines:

```
if(sqrt(dot(N,x,xold))<abstol){
  delete[] xold;
  return;
}
```

should be

```
sum1 = 0.0;
for(i = 0; i<N; i++)
  sum1 += (xold[i]-x[i])*(xold[i]-x[i]);
```

```
if(sqrt(sum1)<abstol){
  delete[] xold;
  return;
}
```

27. p. 393, middle-bottom after the paragraph starting "We can now derive the ...": In the equation $0 = -\mathbf{q}^n \ldots$ there is an extra parenthesis.

28. p. 406, first bullet in the multigrid algorithm section: Replace "... relation sweeps ..." with "... relaxation sweeps ...".

29. p. 420, equation following the statement "Specifically, we obtain for the amplitude" should have a_k^{n+1} on the LHS (as opposed to a_k^n).

30. p. 492, Figure 9.13: In the r.h.s. expression of $\mathbf{LL}^T$, $\mathbf{L}$'s entry l_{12} should be l_{21} for indexing consistency.

31. p. 492, equation following Figure 9.13: a_{11} should not be squared.

32. p. 502, middle bottom: The $[\alpha \ldots 0]^T$ vector needs to have its entries aligned with the vector on the LHS.

33. p. 507, top-middle: Replace "... so they have the same eigenvalues." with "... so they have the same eigenvalues since $\mathbf{B}$ and $\mathbf{M}^{-1/2}\mathbf{B}\mathbf{M}^{1/2}$ have the same eigenvalues."

34. p. 512, Fig. 9.16 Add to caption the following parenthetical note: "(The number of grid points used is $n = 80$)"

35. p. 552, bottom: Better placement of "0" in the matrix.

36. p. 554, middle-bottom: Replace "... an example The initial cost ..." with "an example. The initial cost ..."

37. p. 555, middle: In the second equation from the end, the identity matrix should be bold $\mathbf{I}$.

38. p. 556, middle: Insert the word "initial" between "$\mathcal{O}(\frac{2}{3}n^3)$" and "cost".

39. p. 563, last line: In the last entry, the vector is missing: should be $\mathbf{A}^{k-1}\mathbf{v}$.

40. p. 564: The diagonals in the matrix T_k should be properly aligned.

41. p. 565, bottom: Replace "... corresponding eigenvector and orthogonality is lost." with "corresponding eigenvector, and orthogonality is lost."

42. p. 566: Remark 4: Use semi-colon just before "see".

43. p. 568, top, second equation: The sigma on the RHS be σ^*, also add at the end, "where $*$ denotes complex conjugate".

44. Appendix B, p. 589. In the MPI_Sendrecv command, the recvtag parameter is listed as type MPI_Datatype. Change to int.

45. Appendix B, p. 593. The MPI_Gather is missing 'int root'; it should come between recvtype and comm.

46. Appendix B, p. 594. The MPI_Reduce is missing 'MPI_Datatype datatype'; it should come between count and operator.