Chapter 14 Figures From

MATHEMATICAL METHODS for Scientists and Engineers

Donald A. McQuarrie

For the Novice Acrobat User or the Forgetful

When you opened this file you should have seen a slightly modified cover of the book *Mathematical Methods for Scientists and Engineers* by Donald A. McQuarrie, a menu bar at the top, some index markers at the left hand margin, and a scroll bar at the right margin.

Select the **View** menu item in the top menu and be sure **Fit in Window** and **Single Page** are selected. Select the **Window** menu item and be sure **Bookmarks** and **Thumbnails** ARE NOT selected.

You can and probably should make the top menu bar disappear by pressing the function key F9. Pressing this key (F9) again just toggles the menu bar back on. You may see another tool bar that is controlled by function key F8. Press function key F8 until the tool bar disappears.

In the upper right hand corner margin of the window containing this text you should see a few small boxes. DO NOT move your mouse to the box on the extreme right and click in it; your window will disappear! Move your mouse to the second box from the right and click (or left click); the window containing this text should enlarge to fill the screen. Clicking again in this box will shrink the window; clicking again will return the display to full screen.

The prefered means of navigation to any desired figure is controlled by the scroll bar in the column at the extreme right of the screen image. Move your mouse over the scroll bar slider, click, and hold the mouse button down. A small window will appear with the text "README (2 of 18)". Continuing to hold down the mouse button and dragging the button down will change the text in the small window to something like "14.4 (6 of 18)". Releasing the mouse button at this point moves you to Figure 14.4 of Chapter 14. The (6 of 18) indicates that Figure 14.4 resides on page 6 of the 18 pages of this document.

ANIMATIONS

Figures 14.7, 14.12, 14.13, and 14.14 have associated animations that require QuickTime™ for display. The animations are named Anim14_7.mov, Anim14_12.mov, Anim14_13.mov, and Anim14_14.mov, respectively; they must each be independently acquired from the server.

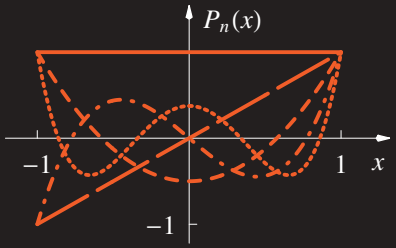

Figure 14.1
The Legendre polynomials $P_0(x)$ (solid), $P_1(x)$ (long dashed), $P_2(x)$ (short dashed), $P_3(x)$ (dash-dot), and $P_4(x)$ (dotted).

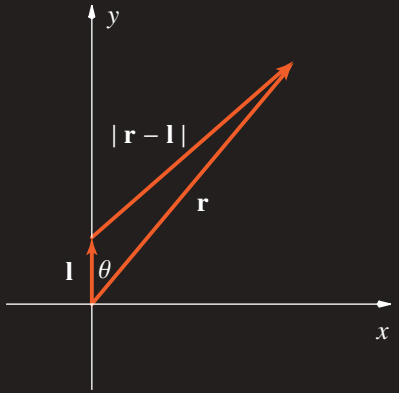

Figure 14.2
The geometry used to calculate the electrostatic potential at **r** due to a charge located at **l**.

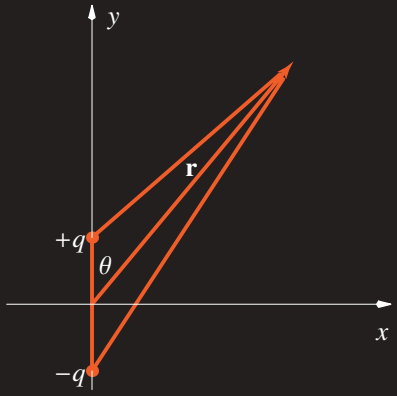

Figure 14.3
The two-charge distribution used to derive Equation 18.

Figure 14.4
The equipotential lines (color) and the corresponding electric field (white) due to the dipole shown in Figure 14.3.

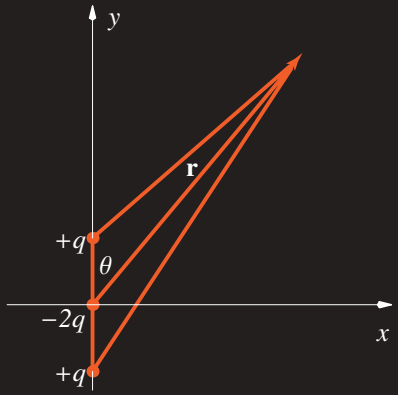

Figure 14.5
The linear quadrupole that is used to determine the electrostatic potential in Example 3.

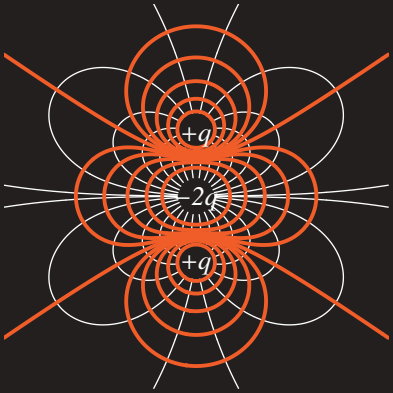

Figure 14.6
The equipotential lines (color) and the corresponding electric field (white) due to the linear quadrupole shown in Figure 14.5.

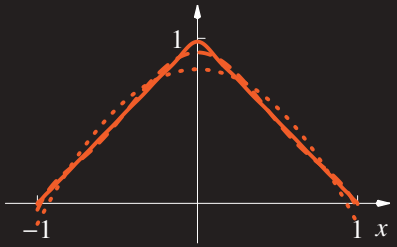

Figure 14.7
Partial sums of the series in Example 5 using 2 (long dashed), 4 (short dashed), and 16 (solid) nonzero terms.

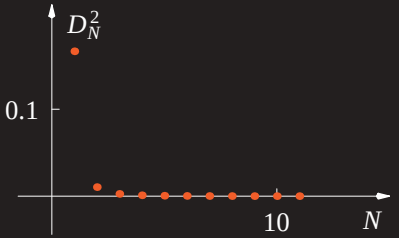

Figure 14.8
A plot of D_N^2 against N for the function given in Example 5 (see also Figure 14.7).

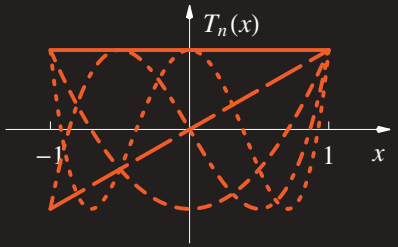

Figure 14.9
The Chebyshev polynomials $T_0(x)$ (solid), $T_1(x)$ (long dashed), $T_2(x)$ (short dashed), $T_3(x)$ (dot-dash), $T_4(x)$ (dotted) plotted against x.

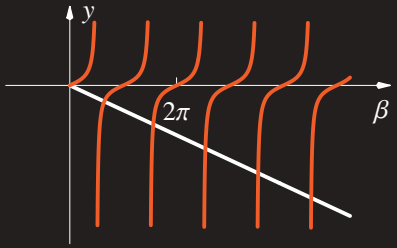

Figure 14.10
The functions $y = -\beta/5$ and $y = \tan\beta$ plotted against β. The eigenvalues of the Sturm-Liouville system in Example 4 are given by the intersections of these lines.

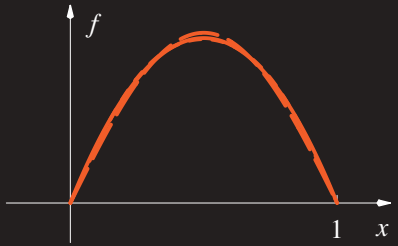

Figure 14.11
The partial sums of $f(x) = x(1 - x)$ given in Example 1. The agreement is excellent using only two nonzero terms in the partial sum.

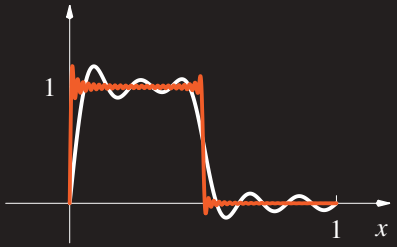

Figure 14.12
The partial sums of $f\ (x)$ given in Example 2 consisting of 10 (white), and 100 terms (color).

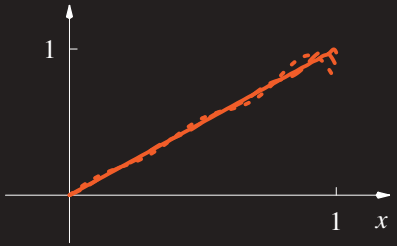

Figure 14.13
The partial sums of Example 3 consisting of 5 (dotted), 10 (short dashed), and 50 (solid) terms.

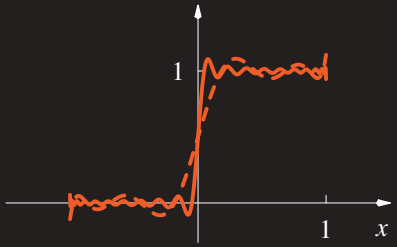

Figure 14.14
The partial sums of the eigenfunction expansion of $f(x)$ given in Example 4 in terms of Legendre polynomials: 10 terms (dashed), and 40 terms (solid).

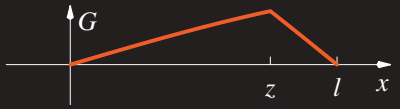

Figure 14.15
An illustration that a Green's function is a continuous function of x and that its first derivative has a discontinuity of 1 at $x = z$.

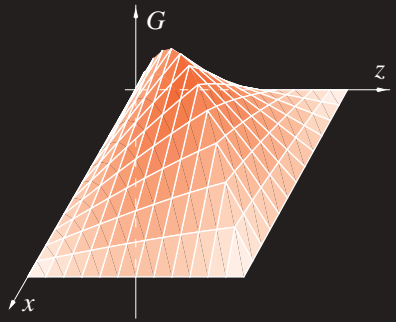

Figure 14.16
The function given by Equation 23 plotted against x and z.