Chapter 10 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 28)". Continuing to hold down the mouse button and dragging the button down will change the text in the small window to something like "10.4 (6 of 28)". Releasing the mouse button at this point moves you to Figure 10.4 of Chapter 10. The (6 of 28) indicates that Figure 10.4 resides on page 6 of the 28 pages of this document.

ANIMATIONS

There are no animations in this chapter at this time.

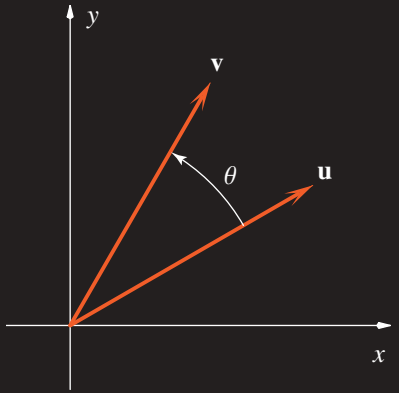


Figure 10.1
The rotation of the vector counterclockwise through an angle θ.

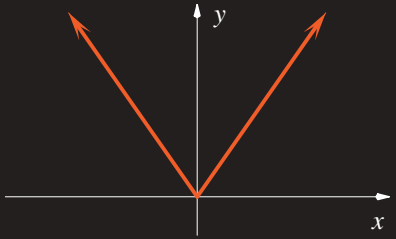


Figure 10.2
The reflection of a vector through the y axis.

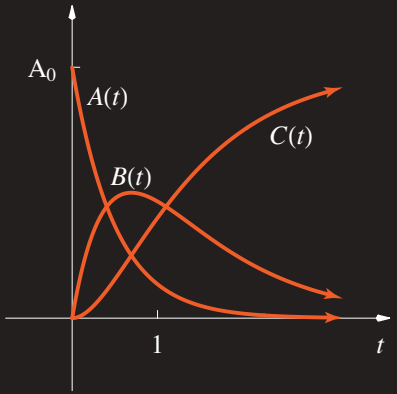


Figure 10.3
The solutions to the radioactive decay rate equations in Example 2.

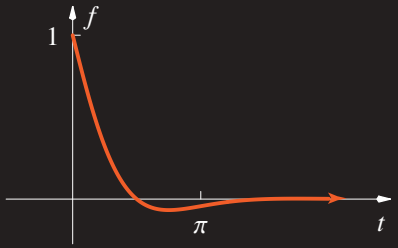


Figure 10.4
An illustration of exponentially damped harmonic behavior. The function $e^{-t}\cos t$ is plotted against t.

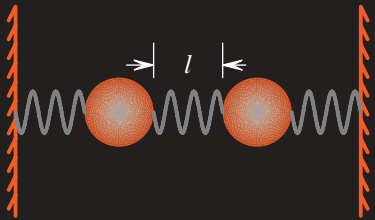


Figure 10.5
Two particles of mass m connected by three identical springs of relaxed length l and constrained to move longitudinally.

Figure 10.6
An illustration of the normal modes of the system shown in Figure 10.5.

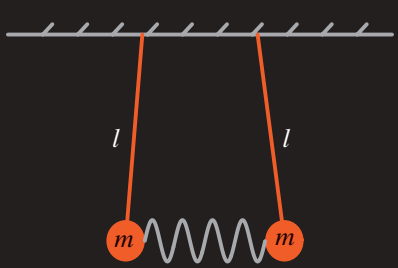


Figure 10.7
Two pendula of length l coupled by a harmonic spring and constrained to move in a single plane.

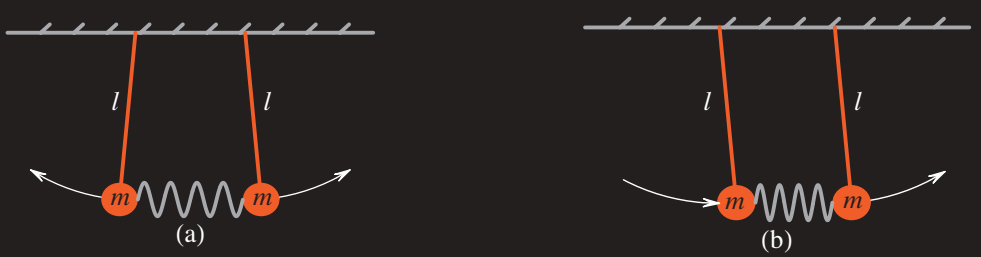


Figure 10.8
An illustration of the two normal modes of the coupled pendula shown in Figure 10.7.

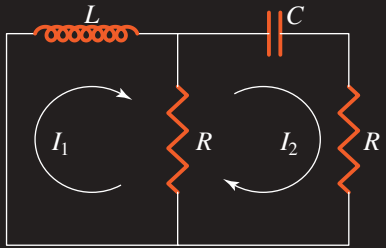


Figure 10.9
The electrical circuit described by Equation 20.

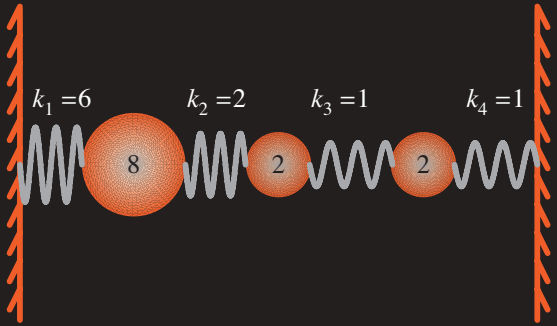


Figure 10.10
The three-mass, four-spring system that is analysed in Problems 14 through 18. The system is allowed to vibrate only longitudinally.

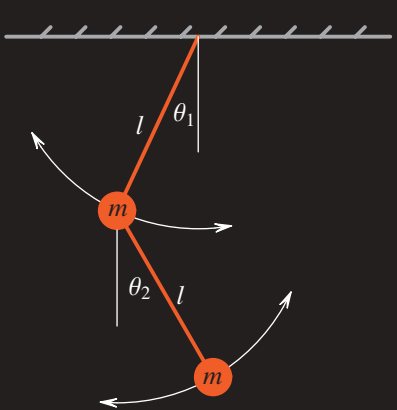


Figure 10.11
A double pendulum. One pendulum is suspended from the other and both are constrained to move in the same vertical plane.

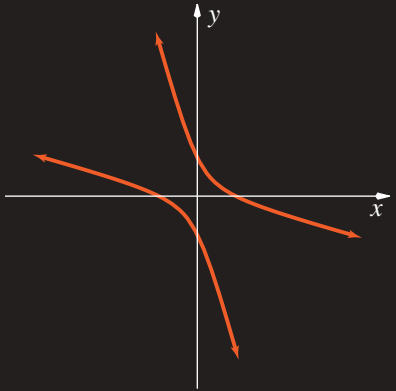


Figure 10.12
The hyperbola described by the equation $x^2 + 4xy + y^2 = 1$.

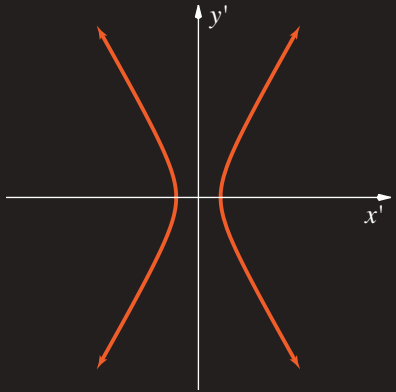


Figure 10.13
The hyperbola that results from rotating the x, y axes in Figure 10.12.

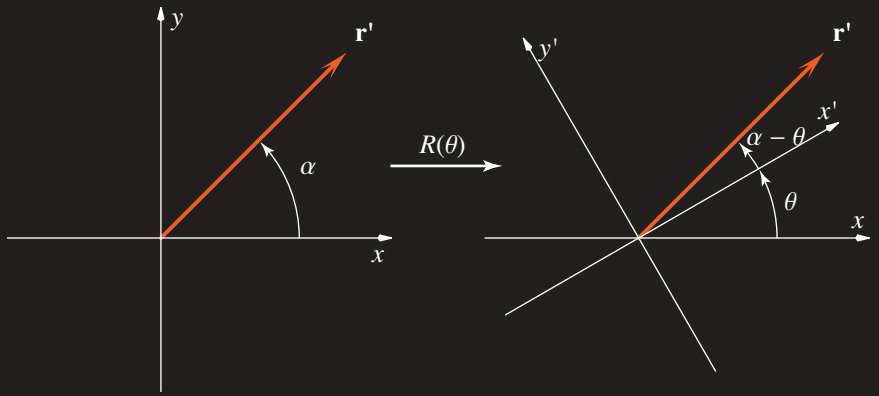


Figure 10.14
An illustration of rotating the x, y axes counterclockwise through an angle $+\theta$. The vector $\mathbf{r}'$ is fixed.

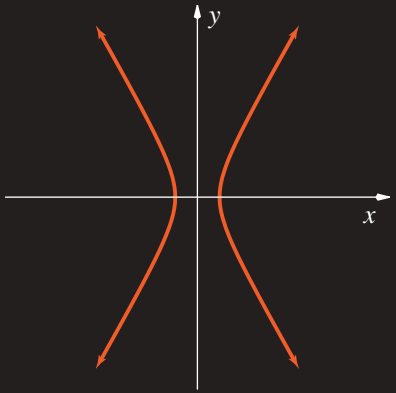


Figure 10.15
The hyperbola described by the equation $f(x, y) = 3x^2 - y^2 = 1$.

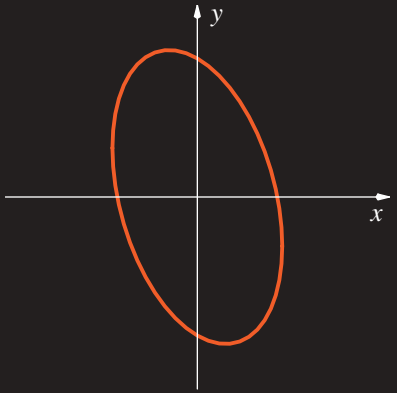


Figure 10.16
A plot of $9x^2 + 2\sqrt{3}\,xy + 3y^2 = 1$, showing that its graph is an ellipse whose major axis is not aligned with either coordinate axis.

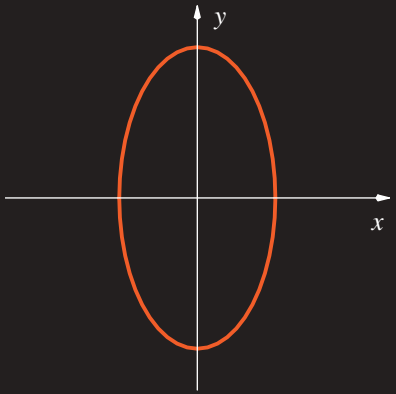


Figure 10.17
The figure in figure 10.16 rotated through 15° so that its axes are aligned with the x axis and the y axis.

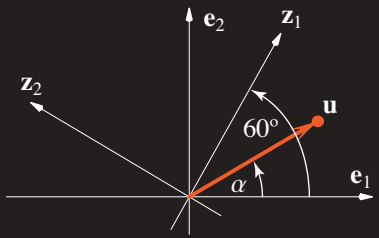


Figure 10.18
The same vector in two coordinate systems (bases) that differ by a rotation through +60°.

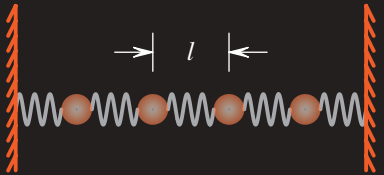


Figure 10.19
Four masses connected by springs. The motion is constrained to be only longitudinal.

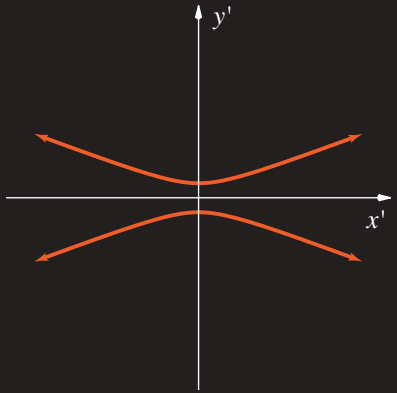


Figure 10.20
A plot of the hyperbola $-x'^2 + 7y'^2 = 1$ determined in Example 1.

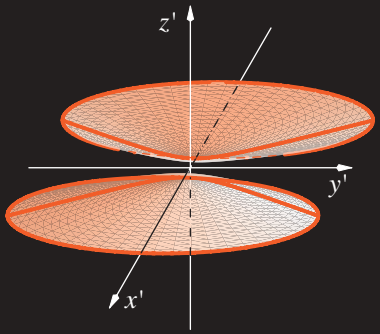


Figure 10.21
A plot of the hyperboloid of two sheets determined in Example 2.

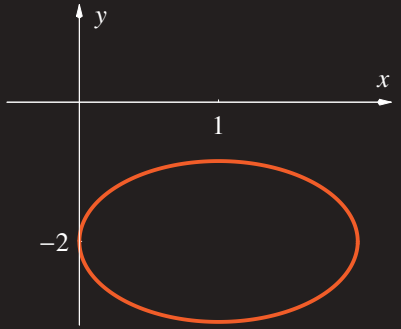


Figure 10.22
A graph of the equation $x^2 - 2x + 3y^2 + 12y + 12 = 0$.

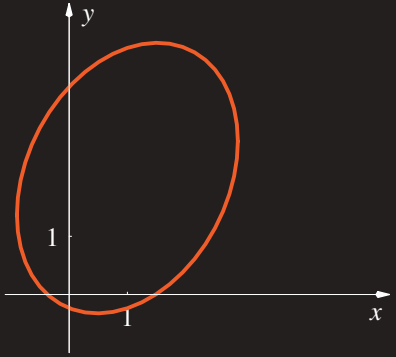


Figure 10.23
A graph of the equation $9x^2 - 4xy + 6y^2 - 10x - 20y = 5$ used in Example 3.

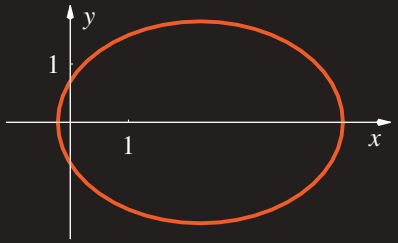


Figure 10.24
The graph of the ellipse described by $(x - \sqrt{5})^2 = 2y^2 = 6$.

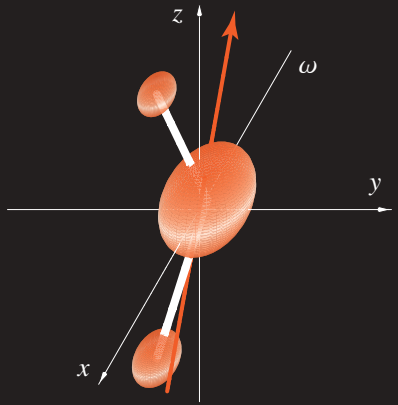
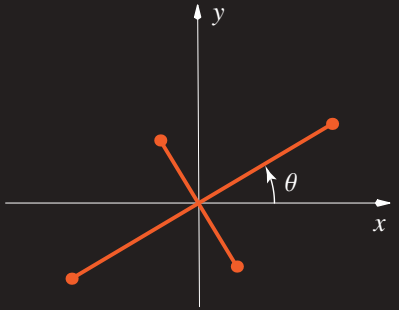


Figure 10.25
A ridgid body rotating about an axis passing through the center of mass of the body.



The "molecule" considered in Problem 17.