FIGURE 2.1

A laser enters a small volume and exits with less energy.

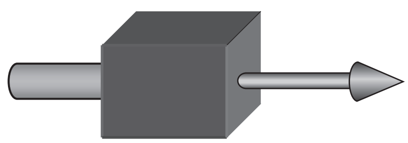

FIGURE 2.2

An illustration of dispersion in the index of refraction. The two resonant features show regions of anomalous dispersion; these regions are accompanied with high loss.

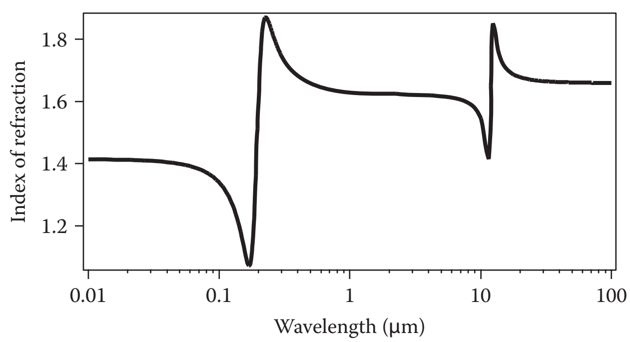

FIGURE 2.3

Intersection of Equation 2.102 with principal planes. The curves indicate the magnitude of the k-vector for a given direction and also illustrate that in general for any propagation direction there exist two magnitudes. For simplicity, the labels give the index of refraction for the given k-vector component. To find the magnitude of the k-vector multiply by ω/c. The arrows represent the direction of the electric field.

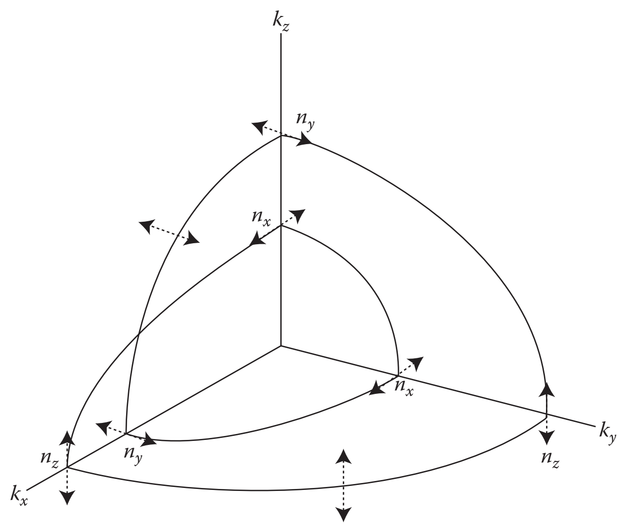

FIGURE 2.4

Directions of various components of an EM wave (a) e-polarized and (b) o-polarized in a birefringent material. Note that $\vec{k}$, $\vec{S}_e$, $\vec{E}$, and $\vec{D}$ are coplanar and that $\vec{H}$ is perpendicular to the plane. ρ is the walkoff angle.

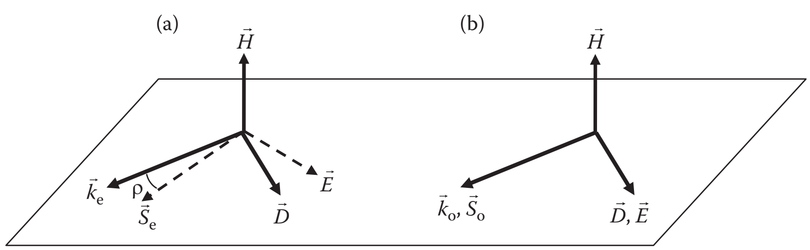

FIGURE 2.5

Poynting vector walk-off. Even at normal incidence the energy of the e-wave will separate from the o-wave. Note that the *k*-vector and the Poynting vector of the o-wave are collinear and parallel to $\vec{k}_e$.

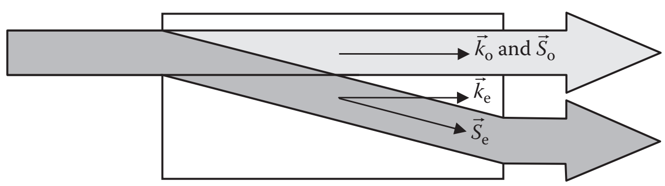

FIGURE 2.6

k-vector magnitude surfaces for uniaxial crystals. The curves are the allowed magnitudes of the k-vector for a given propagation direction. The Poynting vector is normal to these surfaces. (a) Positive uniaxial crystal, walk-off is toward the z-axis (optic axis). (b) Negative uniaxial crystal, walk-off is away from the z-axis.

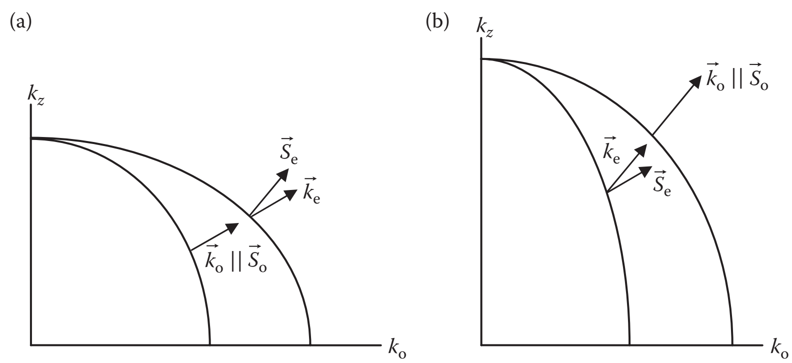

FIGURE 2.7

A uniaxial crystal with the e- and o-polarization directions indicated.

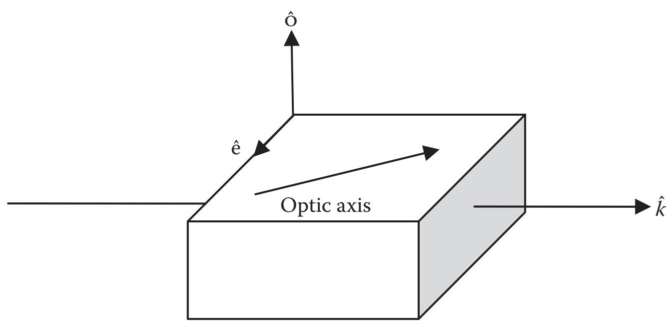

FIGURE 2.8

An index ellipsoid for a uniaxial crystal. The dotted ellipses are the intersection of the plane perpendicular to $\vec{k}$ and the ellipsoid and the equatorial plane.

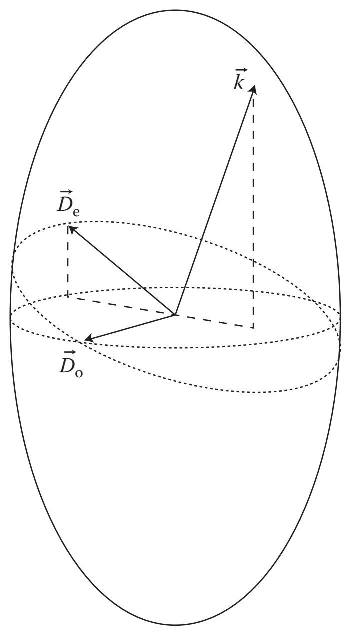

FIGURE 2.9

Cross section of a Gaussian beam along its propagation direction. The thick curves show $w(z)$ whereas the dotted curves show the wavefront curvature. z_R is the Rayleigh range, which is the distance from the beam waist to the point where $w = \sqrt{2}w_o$.

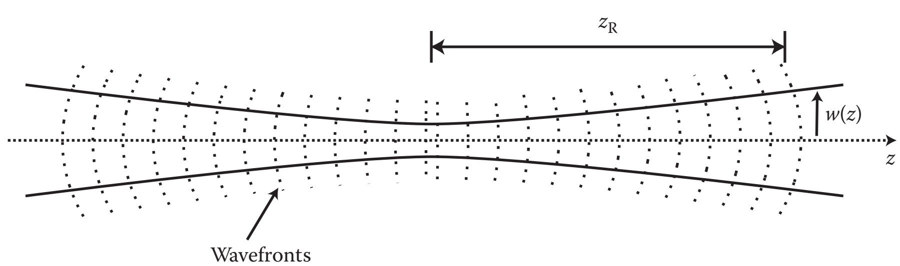

FIGURE 2.10

Down-collimating telescope.

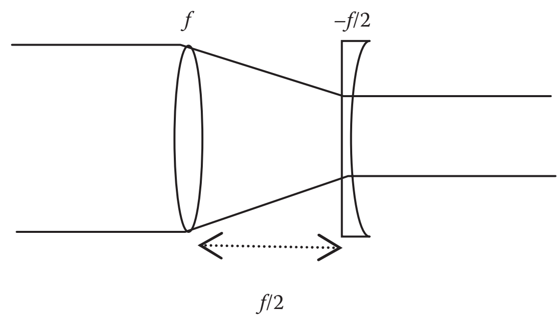

FIGURE 2.11

Measurements of $w(z)$ for an Nd:YAG laser. Notice that it is not necessary to directly measure the beam waist region in order to extract w_o.

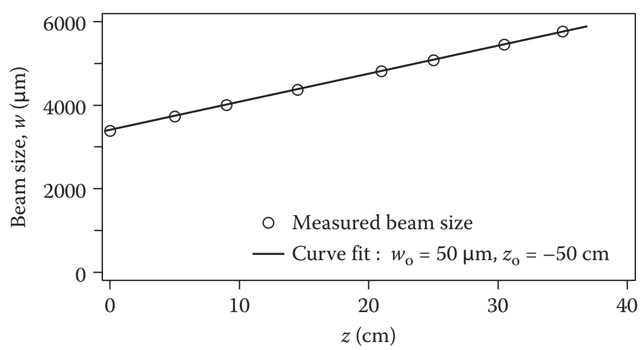

FIGURE 2.12

A relay imaging scheme to focus on a desired size outside of the laser.

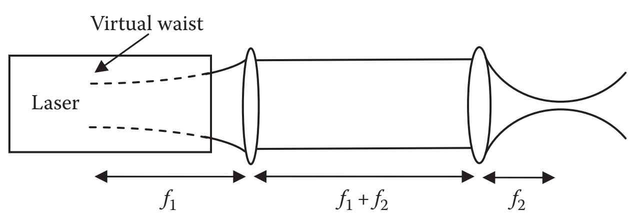

FIGURE 2.13

An illustration of a prism made out of a uniaxial crystal.

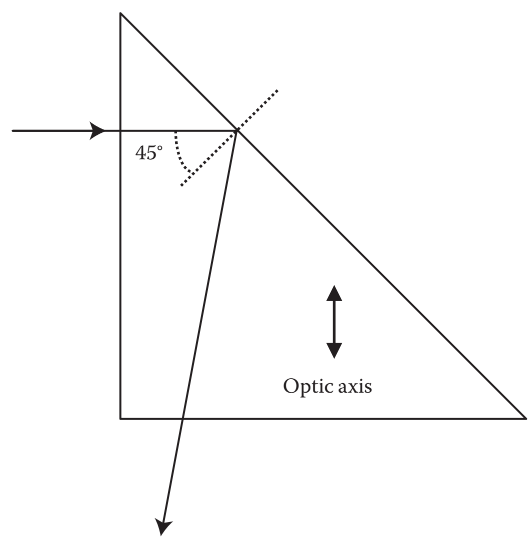

FIGURE 2.14

Transformation of a Gaussian beam with a lens.