CHAPTER OVERVIEW

3: Geometrical Optics

As was shown previously, when a plane wave is impingent on an aperture which has dimensions much greater than the wavelength of the wave, diffraction effects are minimal and a segment of the plane wave passes through the aperture essentially unaltered. This plane wave segment can be thought of as a wave packet, called a *beam* or *ray*, consisting of a superposition of wave vectors very close in direction and magnitude to the central wave vector of the wave packet. In most cases the ray simply moves in the direction defined by the central wave vector, i. e., normal to the orientation of the wave fronts. However, this is not true when the medium through which the light propagates is optically anisotropic, i. e., light traveling in different directions moves at different phase speeds. An example of such a medium is a calcite crystal. In the anisotropic case, the orientation of the ray can be determined once the dispersion relation for the waves in question is known, by using the techniques developed in the previous chapter.

If light moves through some apparatus in which all apertures are much greater in dimension than the wavelength of light, then we can use the above rule to follow rays of light through the apparatus. This is called the *geometrical optics* approximation.