8.1 Introduction

Any attempt to unify the notations and terminology of optics is doomed to failure. This is partly due to the long and illustrious history of the subject (a pedigree shared only with mechanics), which has allowed a variety of approaches to develop, and partly due to the disparate fields of physics to which its basic principles have been applied. Optical ideas find their way into most wave-based branches of physics, from quantum mechanics to radio propagation.

Nowhere is the lack of convention more apparent than in the study of polarisation, and so a cautionary note follows. The conventions used here can be taken largely from context, but the reader should be aware that alternative sign and handedness conventions do exist and are widely used. In particular we will take a circularly polarised wave as being right-handed if, for an observer looking *towards* the source, the electric field vector in a plane perpendicular to the line of sight rotates clockwise. This convention is often used in optics textbooks and has the conceptual advantage that the electric field orientation describes a right-hand corkscrew in space, with the direction of energy flow defining the screw direction. It is however opposite to the system widely used in radio engineering, where the handedness of a helical antenna generating or receiving the wave defines the handedness and is also in the opposite sense to the wave's own angular momentum vector.