

## 1.1 Modes of Electromagnetic Radiation in a Cavity

In order to find the density of radiation inside a cavity we must first investigate the standing wave patterns or *modes* of electromagnetic radiation that can exist in it. We shall find that the number of such modes in a given frequency range is of central importance to the theory of radiation. For simplicity we consider a cavity of rectangular shape. Standing waves in the cavity can then be represented by suitable linear combinations of wave functions based on the fundamental wave function

$$e^{i(\mathbf{k} \cdot \mathbf{r} - \omega t)} = e^{ik_x x} e^{ik_y y} e^{ik_z z} e^{-i\omega t}$$