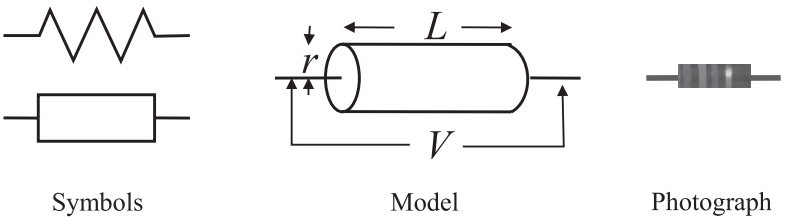

FIGURE 2.1. The resistor as used in electrical circuits. The upper symbol was completely standard,but has more recently been replaced by the lower one. They are used in circuit diagrams regardless of the specific type of resistor used. We can model a resistor as a long cylinder, made of some uniform, isotropic material, with wires attached to the flat faces. The model quite resembles a standard carbon resistor. The colored bands on the resistor are a code for its resistance value and precision standards.

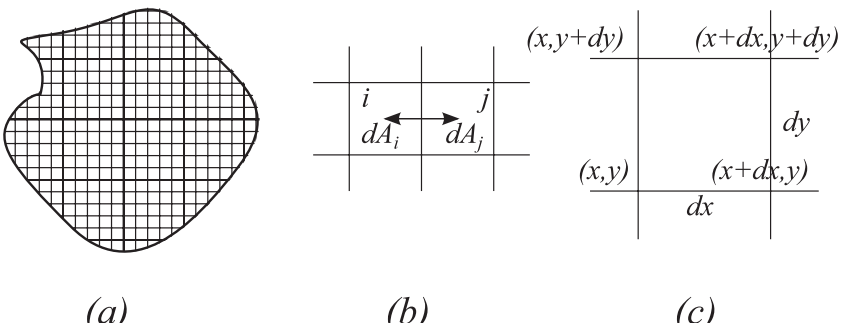

FIGURE 2.2. Geometric explanation of the derivation of the divergence theorem. (a) The volume integral over a region is the sum of small rectangles (or rectangular blocks in three dimensions). (b) Any quantity proportional to the area of a volume element cancels on adjacent cells, leaving only the edges on the boundary. (c) Coordinate system for analyzing the integral over one small cell.

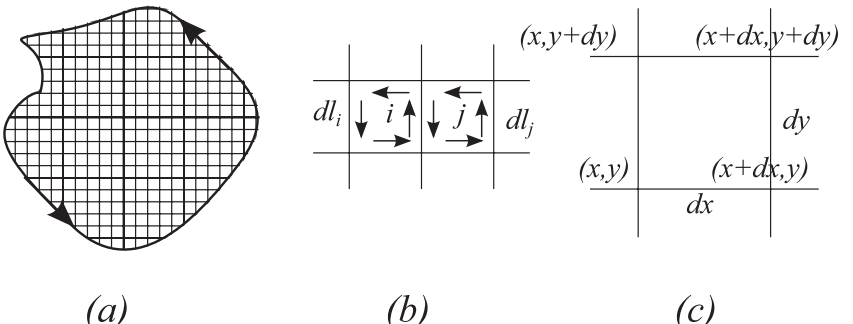

FIGURE 2.3. Geometric explanation of the derivation of Stokes' theorem. (a) The surface integral over a regionis the sum of small rectangles. (b) Any quantity proportional to a loop over the area element cancels on adjacent cells, leaving only the edges on the boundary. (c) Coordinate system for analyzing the integral over one small cell.

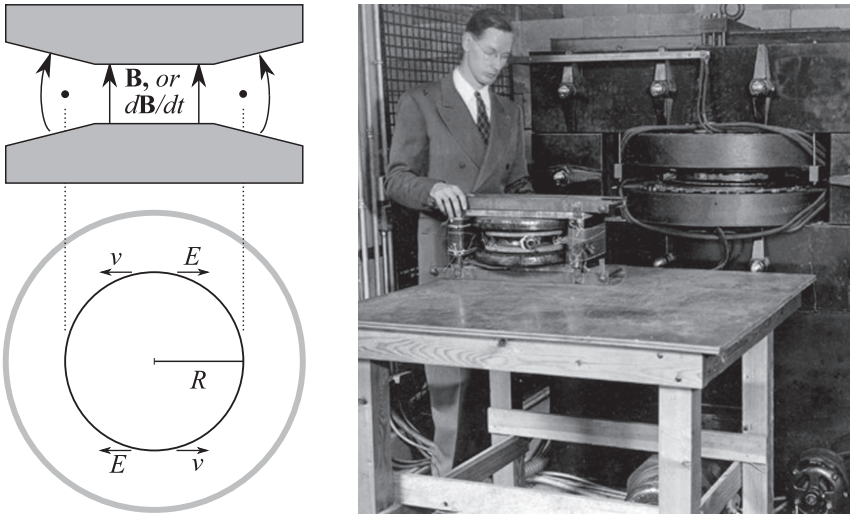

FIGURE 2.4. A Betatron accelerates particles using the electric field from magnetic induction. The diagram shows the principle, and defines quantities that allow us to derive the so-called *Betatron Condition*. The photograph (Courtesy Department of Physics, University of Illinois at Urbana-Champaign) shows early Betatrons with inventor, Donald Kerst.

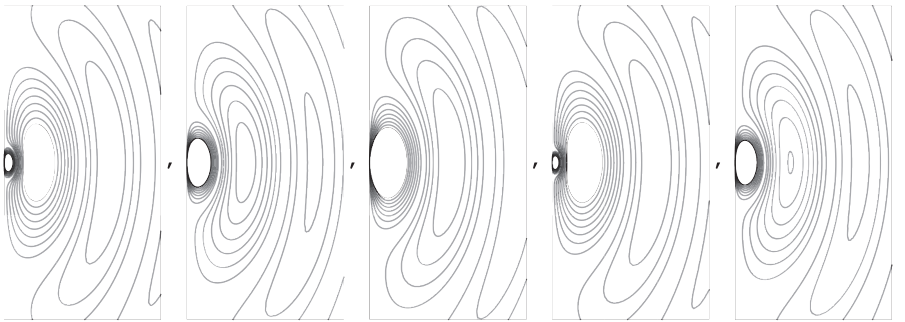

FIGURE 2.5. A schematic representation of electric dipole radiation. The frames from left to right represent increasing time, while each frame represents the same portion of space. The lines are contours of constant electric field strength. The source is an infinitesimally small oscillating electric dipole at the origin, oriented in the vertical direction. The field strength is inversely proportional to distance from the origin, with the field lines forming closed loops that move away from the dipole.