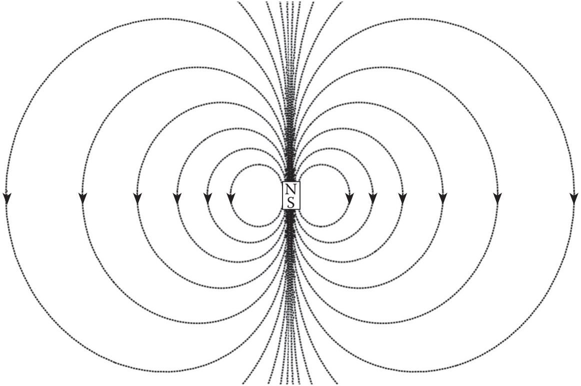

Figure C.1 Magnetic flux lines around a permanent magnet. Flux lines are defined to go from the "north pole" (N) to the "south pole" (S) of the magnet.

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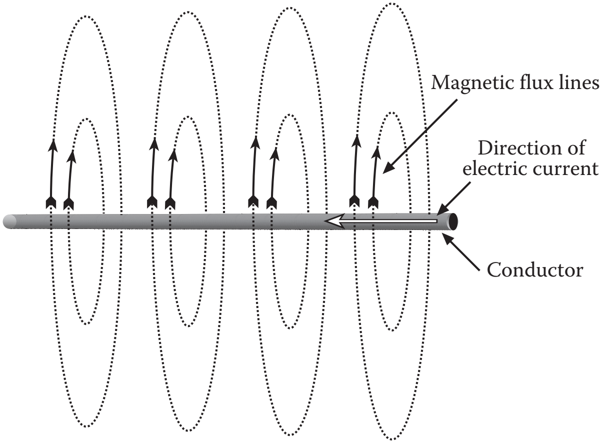

Figure C.2 Magnetic flux lines around a conductor carrying DC: the "right-hand rule."

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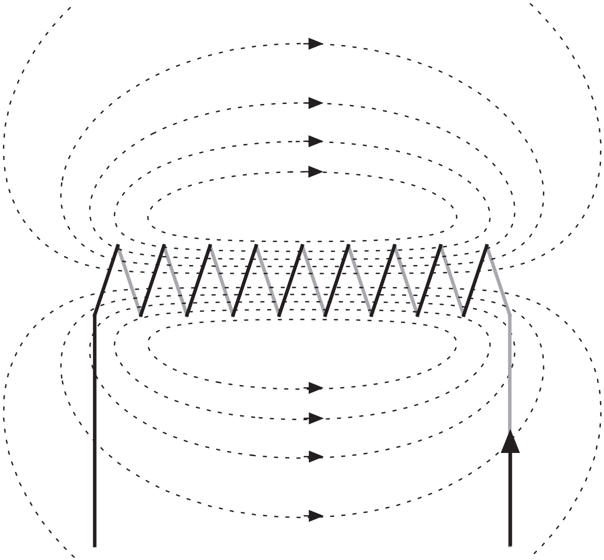

Figure C.3 Magnetic flux lines around a solenoid made of nine turns of wire.

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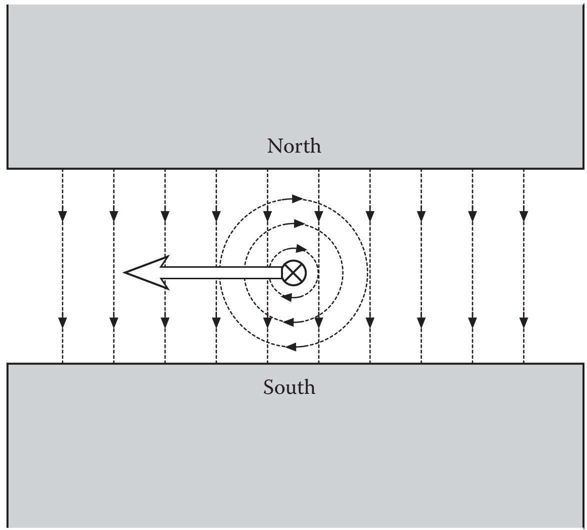

Figure C.4 An electric conductor carrying current in a magnetic field. The current is directed perpendicularly into the page. The large arrow indicates the direction of the force acting on the conductor.

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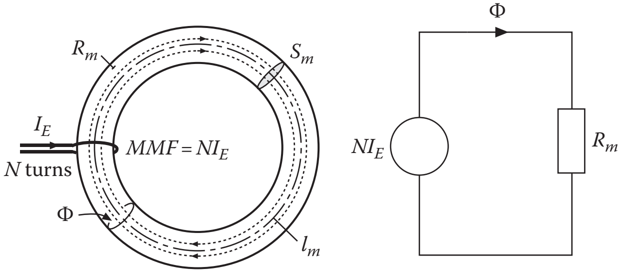

Figure C.5 An electric current induces a magnetic field in a ferromagnetic core. The flux is determined by the reluctance and the *MMF*.

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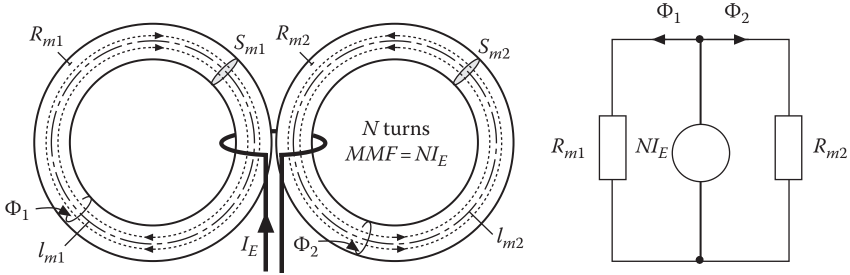

Figure C.6 Two parallel ferromagnetic core circuits being driven by a common *MMF.* The flux is split between the cores.

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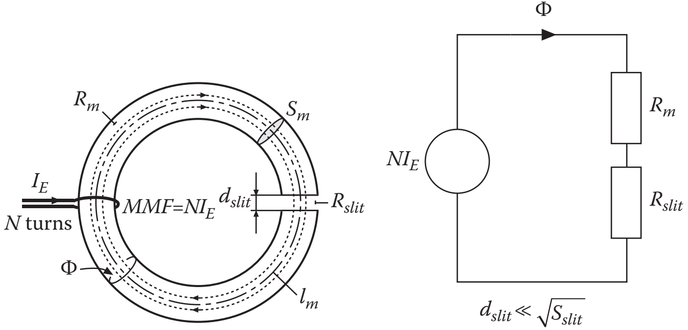

Figure C.7 An electric current is driving a ferromagnetic toroidal core that has an air gap. The system forms a series magnetic circuit. The total reluctance in the circuit is determined by the sum of the reluctances of the core and the air gap. Here the air gap is assumed to be so small compared to the width of the air gap that the leakage flux is negligible.

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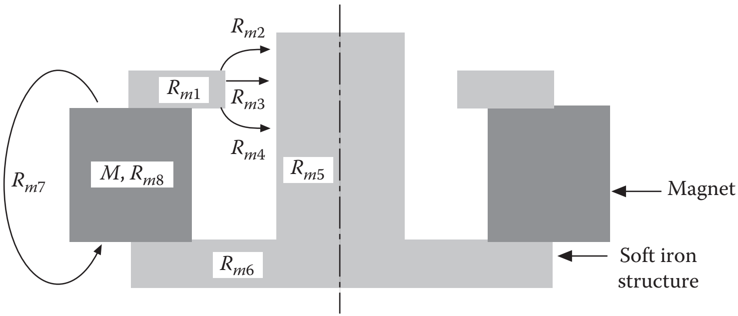

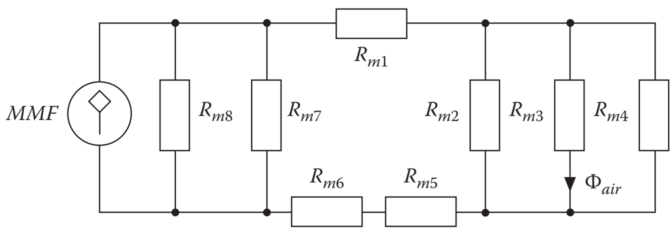

Figure C.8 The magnetic circuit of an electrodynamic loudspeaker magnet system has many reluctances. Reluctances: (1) top plate, (2) upper air gap leakage, (3) air gap, (4) lower air gap leakage, (5) center pole piece, (6) lower plate, (7) leakage around magnet perimeter, and (8) internal magnet reluctance. The flux in the air gap for the voice coil is Φ_{air}.

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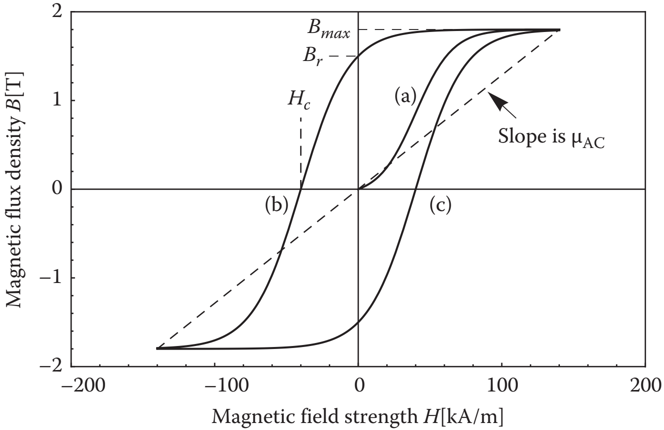

Figure C.9 A hysteresis curve characteristic for a ferromagnetic material driven close to saturation.

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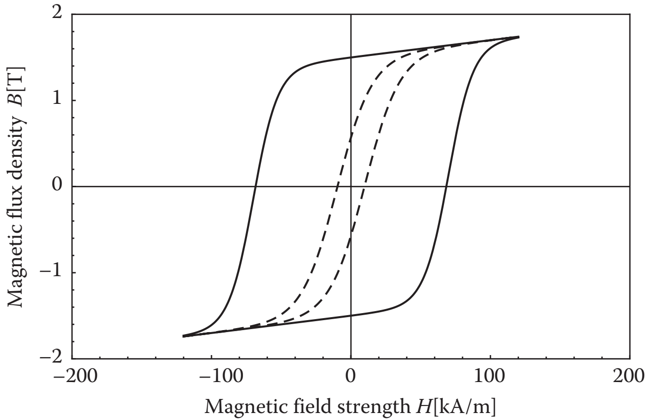

Figure C.10 Examples of hysteresis curve characteristics for a "hard" ferromagnetic material (solid line) and a "soft" ferromagnetic material (dashed line). Note that the magnetic field strength scale is given in (kA/m) here.

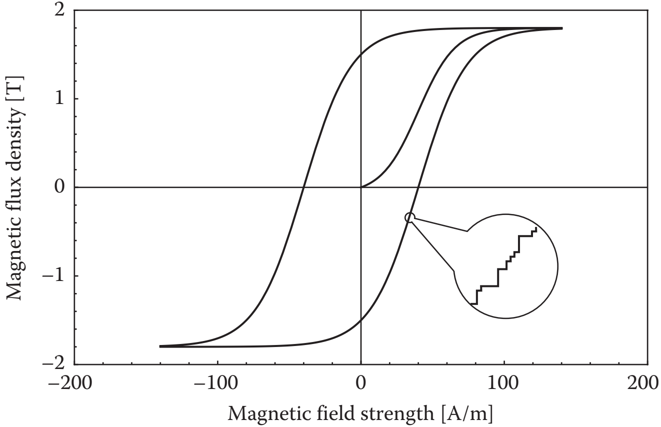

Figure C.11 The flux density does not change continuously in a ferromagnetic material. As the magnetization force changes, the domains switch directions and the flux density changes in steps, called Barkhausen jumps.

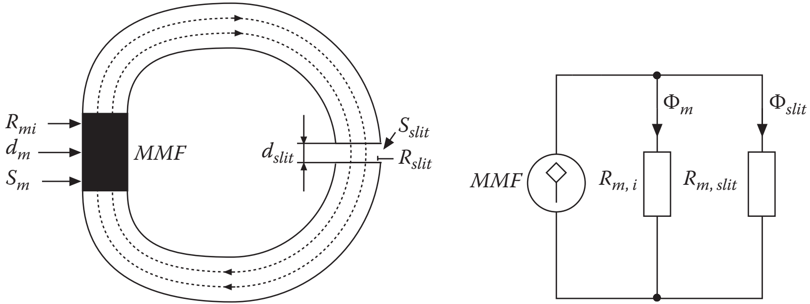

Figure C.12 A cylindrical permanent magnet is driving a ferromagnetic semi-toroidal core that has an air gap. The air gap is assumed to be so small compared to the width of the air gap that the leakage flux is negligible. The reluctances of the pole pieces are neglected since they are assumed small compared to the air gap reluctance.

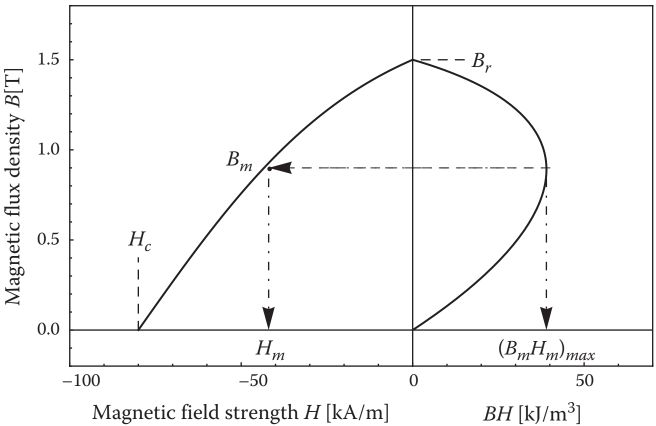

Figure C.13 The second quadrant of the hysteresis curve is shown here along with a graph of the BH product at various points on the curve. A simple graphical method can then be used to determine the operating point on the hysteresis curve that gives the maximum magnetic energy density.

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