

Indução eletromagnética e lei de Faraday

- A única possível solução é dizer que uma variação de campo magnético pode gerar um campo elétrico, e este último gera a corrente.
- Assim, a fem induzida seria dada por

$$\mathcal{E} = -\frac{d\Phi}{dt} = \oint \mathbf{E} \cdot d\mathbf{l}$$

- Como $\mathcal{E} \neq 0$, a modificação necessária na eletrostática deve ser tal que $\nabla \times \mathbf{E} \neq \mathbf{0}$.
- Substituindo Φ , vem

$$\oint \mathbf{E} \cdot d\mathbf{l} = - \int \frac{\partial \mathbf{B}}{\partial t} \cdot d\mathbf{a}.$$

- Logo,

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$$

- Que é a lei de Faraday. Ela mostra que variação de campos magnéticos geram campos elétricos.

Anel saltador e lei de Lenz

Example 7.6

The “jumping ring” demonstration. If you wind a solenoidal coil around an iron core (the iron is there to beef up the magnetic field), place a metal ring on top, and plug it in, the ring will jump several feet in the air (Fig. 7.23). Why?

Solution: Before you turned on the current, the flux through the ring was *zero*. Afterward a flux appeared (upward, in the diagram), and the emf generated in the ring led to a current (in the ring) which, according to Lenz’s law, was in such a direction that *its* field tended to cancel this new flux. This means that the current in the loop is *opposite* to the current in the solenoid. And opposite currents repel, so the ring flies off.⁸

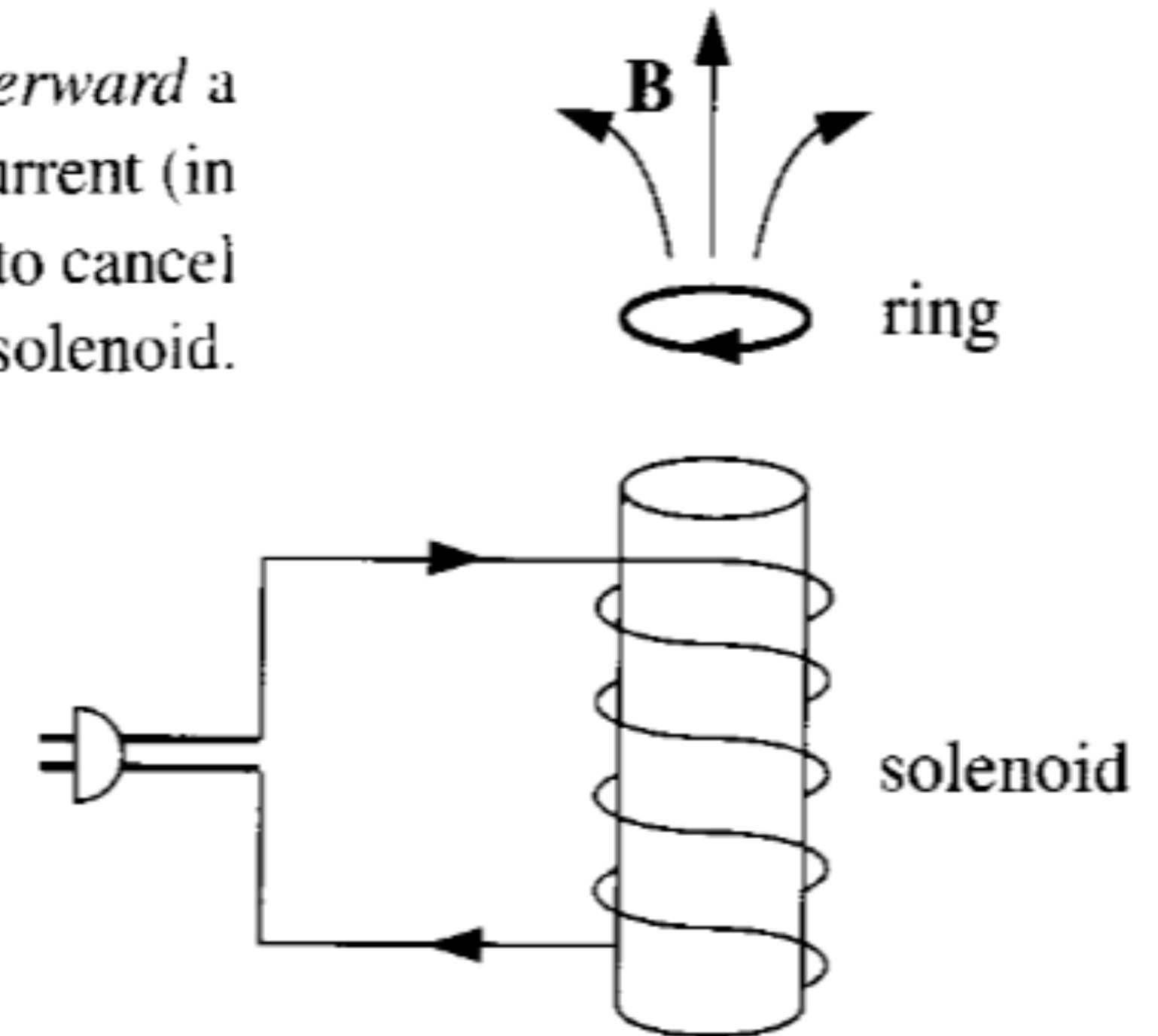


Figure 7.23

Exercícios: 7.12, 7.14