Exercise 57

Introduction to Electrodynamics

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Solution

Verified

Step 1

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The same flux, let us call it Φ, passes trough every turn of each coil. Thus, we have:

$$\Phi_1 = N_1\Phi \qquad \Phi_2 = N_2\Phi$$

The EMFs generated in each of the coil are the sums of EMFs generated in single turns:

$$\mathcal{E}_1 = -\dot{\Phi}_1 = -N_1\dot{\Phi} \qquad \mathcal{E}_2 = -\dot{\Phi}_2 = -N_2\dot{\Phi}$$

$$\Longrightarrow \boxed{\frac{\mathcal{E}_1}{\mathcal{E}_2} = \frac{N_1}{N_2}}$$

Result

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$$\boxed{\frac{\mathcal{E}_1}{\mathcal{E}_2} = \frac{N_1}{N_2}}$$

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