A Coil Moving Through a Magnetic Field

A loop of wire moves through a magnetic field $\boldsymbol{B}$ into the page with velocity $\boldsymbol{v}$. From Faraday's law, when the wire moves *into* the magnetic field, and when it moves *out* of the field, magnetic flux Φ_m changes, creating an electromotive force $\mathcal{E}$:

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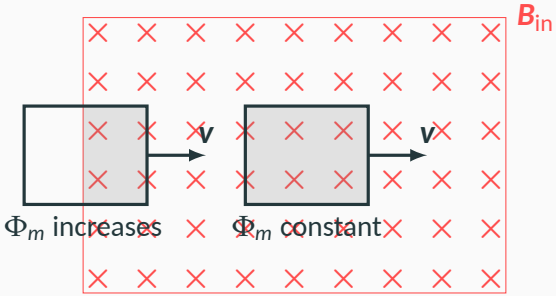

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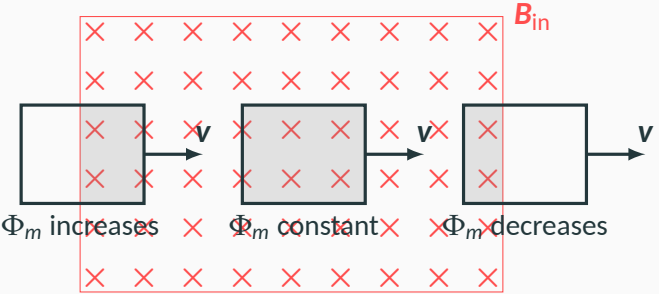

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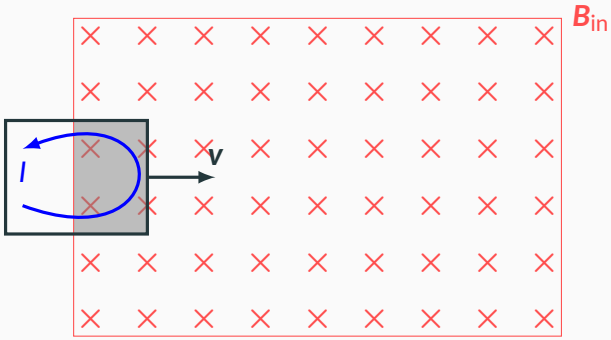
For an observer in the same frame of reference as the magnetic field, the reason is obvious. The charges[1] inside the wire experience a *magnetic force* as they move through the magnetic field, creating an *emf*, and an electric current. This is called **motional EMF**.



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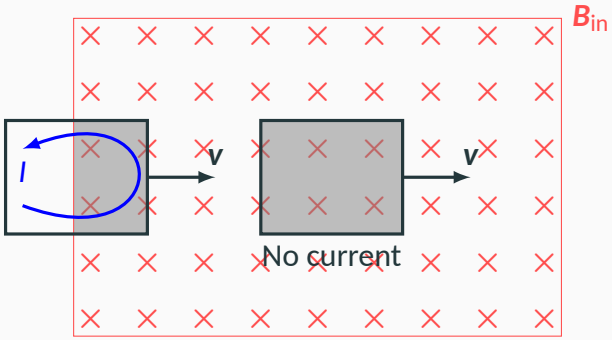

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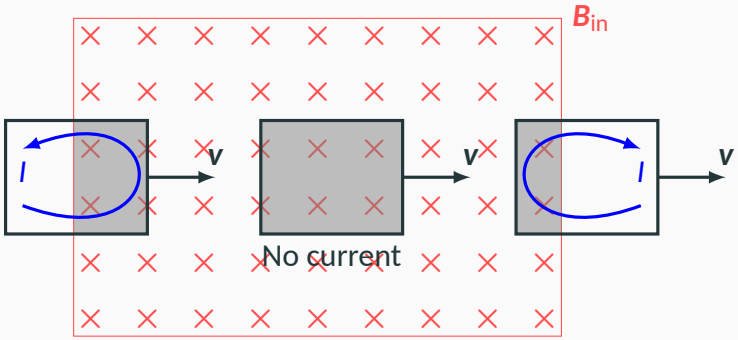

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Magnetic Field Moving Past a Coil of Wire

For an observer in the same frame of reference as the wire, the reason is also obvious. As the magnetic field moves, the magnetic flux changes, and an *electric field* is created in the wire. A current is created because the charges inside the wire experience an *electric force*.

Assymmetry in Faraday's Law

Both observers obtain the same result (same $\mathcal{E}$ and same current *I* in the wire), however they cannot agree on the *reason*