Faraday's Law of Induction (2)

Here the change in magnetic flux Φ_B is caused by a moving bar magnet.

- Assume area vector $\vec{A}$ of loop pointing right.
  Hence positive direction around loop is clockwise.
- Motion of bar magnet causes $\dfrac{d\Phi_B}{dt} > 0$.
- Faraday's law: $\mathcal{E} = -\dfrac{d\Phi_B}{dt}$.
- Induced EMF is in negative direction, $\mathcal{E} < 0$,
  which is counterclockwise.
- Induced EMF reflects induced electric field: $\mathcal{E} = \oint_C \vec{E} \cdot d\vec{\ell}$.
- Field lines of induced electric field are closed.
- Faraday's law is a dynamics relation between electric and magnetic fields: $\oint_C \vec{E} \cdot d\vec{\ell} = -\dfrac{d}{dt} \int_S \vec{B} \cdot d\vec{A}$.