where $z = vt$. A superconductor (no resistance) will actually produce a current that will exactly cancel the flux passing through the loop. The electro-motive force generated is from the self inductance:

$$\varepsilon = L\frac{dI}{dt}$$

We also know that the induced electro-motive force is related to the time derivative of the flux.

$$\varepsilon = -\frac{1}{c}\frac{\partial\Phi}{\partial t}$$

Comparing the two expressions and integrating, we find that the current is proportional to the flux up to a constant:

$$I(t) = -\frac{1}{Lc}\Phi(t) + C = -\frac{1}{Lc}2\pi s\left(1 - \frac{vt}{\sqrt{R^2 + (vt)^2}}\right) + C$$

Therefore, the change in current before and after a monopole passes through the loop is:

$$I(t \to \infty) - I(t \to -\infty) = \frac{4\pi s}{Lc}$$