*Induced current in a superconducting contour.* Repeat Question 6.12 (given below) but for a superconducting contour brough in a uniform magnetostatic field.

*Magnetic flux due to the induced current in a contour.* A rectangular copper contour of area $S$ is first situated outside any magnetic field, and there is no current in it. The contour is then brought in a uniform time-invariant magnetic field of flux density $B$ and positioned so that the vector $\mathbf{B}$ is perpendicular to the plane of the contour (like the situtation in Fig. Q6.3). In the new steady state, the magnetic flux through the contour due to the current induced in it, computed with respect to the same orientation as that of the vector $\mathbf{B}$, equals

(A) $\Phi_{\text{ind}} = BS$,
(B) $\Phi_{\text{ind}} = -BS$,
(C) $\Phi_{\text{ind}} = kBS$,
(D) $\Phi_{\text{ind}} = -kBS$,
(E) $\Phi_{\text{ind}} = 0$,

where $k$ is a dimensionless constant and $0 < k < 1$.

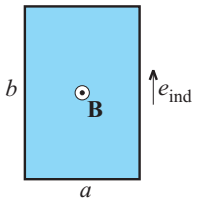


**Figure Q6.3** Wire loop in a uniform low-frequency time-harmonic magnetic field of flux density vector $\mathbf{B}$; for Question 6.11.

*Solution:* (B)
*Answer:* (B)