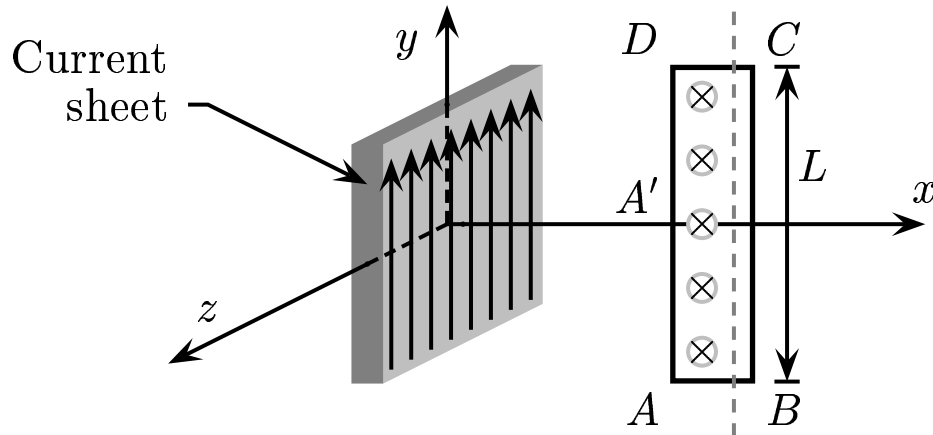


$I$  is flowing along the positive  $y$ -axis in  $yz$ -plane at  $x = 0$ . The current direction is shown by arrows in the current sheet. At some instant after turning on  $I$ , the front of the  $\vec{B}$  field passes window  $ABCD$  with speed  $v$  as shown in the figure.



Determine the direction of  $\vec{E}$  at  $A'$ .

- A) The direction of  $\vec{E}$  is  $\uparrow$ .
- B) The direction of  $\vec{E}$  is  $\rightarrow$ .
- C) The direction of  $\vec{E}$  is  $\downarrow$ .
- D) The direction of  $\vec{E}$  is  $\leftarrow$ .

Faraday's law:  $\mathcal{E} = \oint \vec{E} \cdot \vec{ds} = -\frac{d\phi}{dt}$ ;  $\mathcal{E} = EL$  and  $\phi = BLx$ . Faraday's

law implies that the induced emf is out of the window, or the induced field

$\vec{E}$  is along  $AD$ , *i.e.* it is down.

Answer **C**.

34.05-02 Plane EM Waves 2004-3-24