APPLICATIONS OF AMPERES CIRCUITAL LAW

$\overline{H}$ due to infinite sheet of Charge

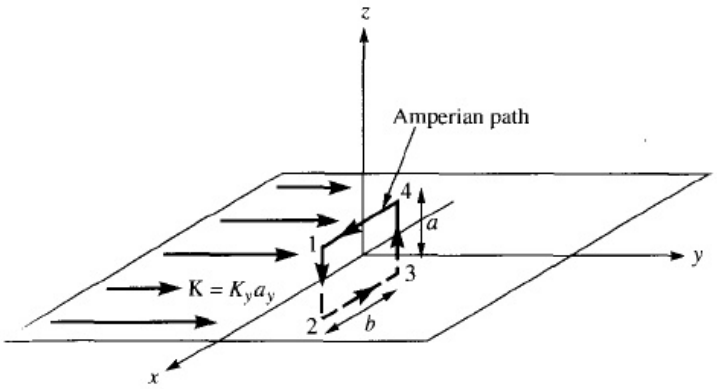

Fig 12: Applications of Ampere's law for an infinite sheet a)
Closed path 1-2-3-4-1.

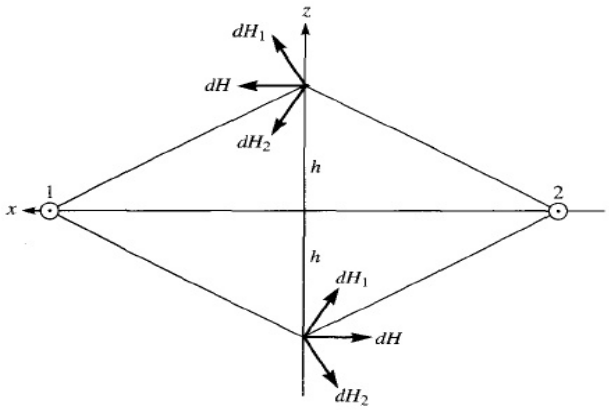

Fig 12 b: symmetrical pair of current filaments with current along a_y

- Consider an infinite sheets of current in Z = 0 plane. The surface current density is $\overline{K}$. The current is flow in positive Y direction.

Hence $\overline{K}. = \overline{K_y}$ ay.

$\int_4^1 \overline{H}.dL = \int_4^1 (\overline{H}_x - ax)dx$.dx = $\overline{H}_x \int_4^1 dx$

$\oint \overline{H}$. dl = b $\overline{H}_x$ + b $\overline{H}_x$ =2b $\overline{H}_x$

2b $\overline{H}_x = \overline{K_y}$.b

$\overline{H}$ = ½ $\overline{K_y}$. ax

for z > 0

= -1/2 $\overline{K_y}$. ax

for z <0

In general, $\overline{H}$ = ½ $\overline{K}$. . aN