TFY 4240

Øving 5 2006

**Problem 1**

a) Three long wires are placed as shown in figure 2.1. Each carries a current I=10A in the same direction, normal to the plane of the paper. Use Ampére's law to find the magnetic field around a long straight conductor and then find the total field in point P in figure 2.1 at a distance $r_1$ from the middle conductor by adding the fields from the individual conductors.

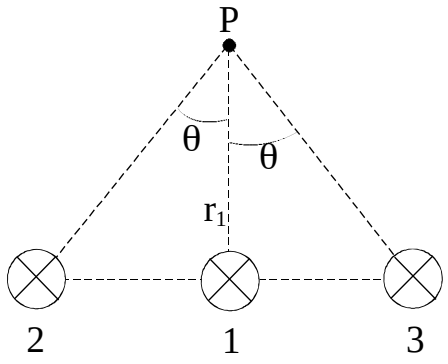


**Figure 2.1**

b) We make an infinite current conducting sheet by adding many conductors as shown in figure 2.2. The figure only shows a section of the sheet. The conductors are lying in the xy-plane and the current flows in the y-direction. All conductors carry the same current I and we have n conductors per unit length in the x-direction. Show that the magnetic field is homogeneous and us Ampére's law to show that the field near the sheet is $B = \frac{1}{2}\mu_0 nI$. What is the direction of the field?

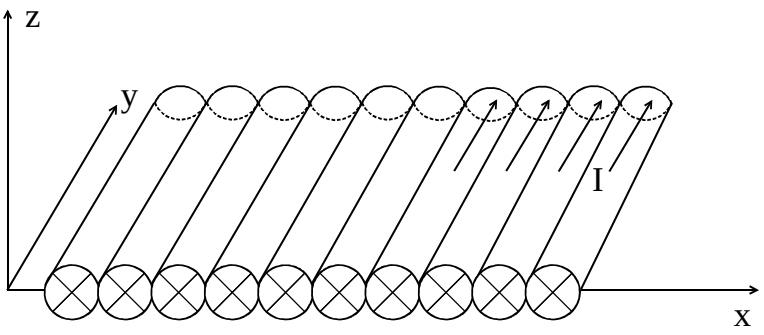

**Figure 2.2**

c) 3 of the conductors in the sheet break down so that they no longer carry a current. Calculate the field at the point P at a distance $r_1$ from the middle of the three broken conductors. See figure 2.3. What is the direction of the field at the point P?

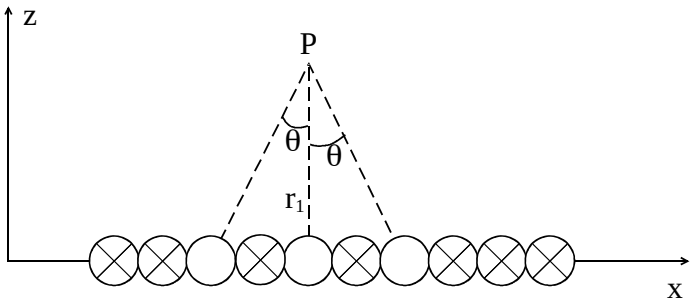


**Figure 2.3**

**Problem 2**

Problem 5.10 in Griffiths.

**Problem 3**

Problem 5.12 in Griffiths.

**Problem 4**

Problem 5.22 in Griffiths