MyOpenMathPD

June 13, 2022

1 My Open Math PD

1.1 Question Text

$image

The current density in a cylindrical wire of radius `R=$R` mm is uniform accross a cross section of the wire and is `J=$J\times 10^5 A/m^2`. What is the current through the outre portion of the wire between radial distances `R/2` and `R`?

Because the current density is uniform across the corss section, the current density `J`, the current `i`, and the corss-sctional area `A` are related to `J=i/A`.

We want only the current through a reduced cross-sectional area `A_O` of the wire (rather than the entire area), where the equation we desire in terms of `R` is:

`A_O=` $answerbox[0] (Use `R` for you variables).

Plugging in what we know we have `A_O=` $answerbox[1]

What equation should be used to find the current in terms of `i`, `J`, and `A_O`? $answerbox[2]

What is the current through the outer protion? $answerbox[3]

1.2 Code

```
$anstypes = array("numfunc","calculated","numfunc","calculated","choices")
$variables = "R,i,J,A_O"

$J = prettysigfig(rrand(1,3,0.1),2)
$R = prettysigfig(rrand(1,3,0.1),2)

$answer[0] = "pi R^2 - pi (R/2)^2"
$AO = pi ($R*10^(-3))^2 - pi (($R*10^(-3)/2))^2
$answer[1] = prettysigfig($AO,2)
$answerformat[2] = "equation"
$answer[2] = "i=JA_O"
$C = ($J*10^5)*($AO)
$answer[3] = prettysigfig($C,2)
$choices[4] = array("`A`","`m`","`m^2`","`A/m^2`")
$displayformat = "select"
$answer[4] = 0
```

[10]:
```
A(R):=%pi*R^2-%pi*(R/2)^2;
float(A(1.8*10^(-3)));
```

[10]:

$$A\left(R\right) := \pi\, R^2 - \pi \left(\frac{R}{2}\right)^2 \qquad (\%o_{16})$$

[10]:

$$7.634070148223198 \times 10^{-6} \qquad (\%o_{17})$$

[ ]: