

Five Common BC for Heat xfer

FAM (5)
6 Feb 2019

1. know the Temp

e.g. $r = R$ $T = T_0$

2. know the value of the flux

e.g. $x = L$ $\frac{q}{A} = q_0$ ($q_0 = 0$ insulated wall)

3. Newton's law of cooling

e.g. $x = B$ $-k \frac{dT}{dx} = \frac{q}{A} = h (T_{\text{bulk}} - T_{\text{wall}})$

$T(B)$
↓

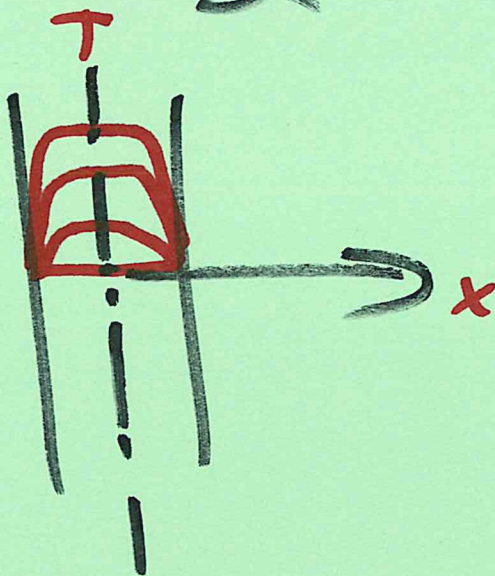
wall location both parts needed

6

4. Symmetry

$$x=0$$

$$\frac{dT}{dx} = 0$$

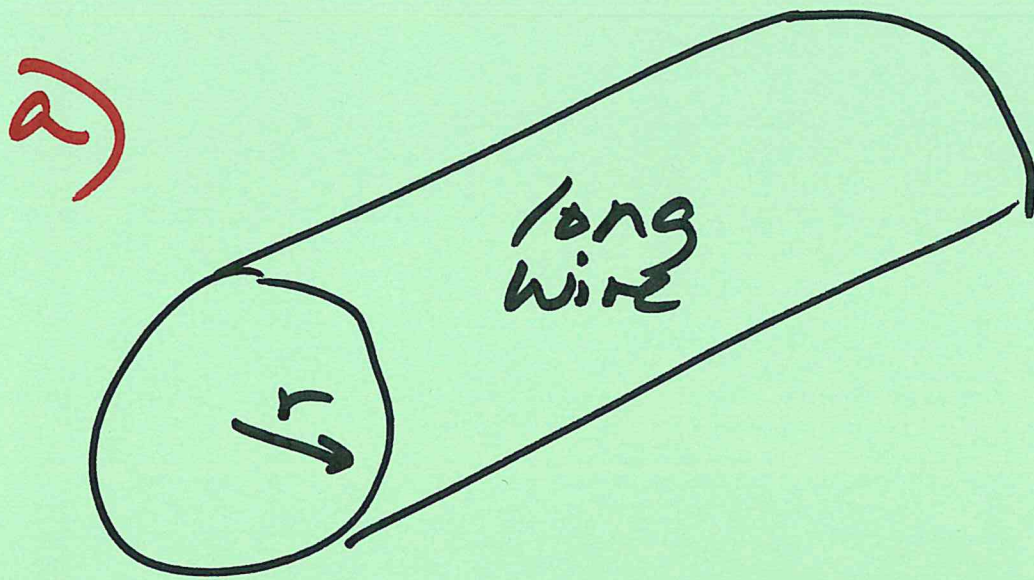


* note:
 this is
 only true if
 the (e.g. $r=0$)
 point is in
 the domain

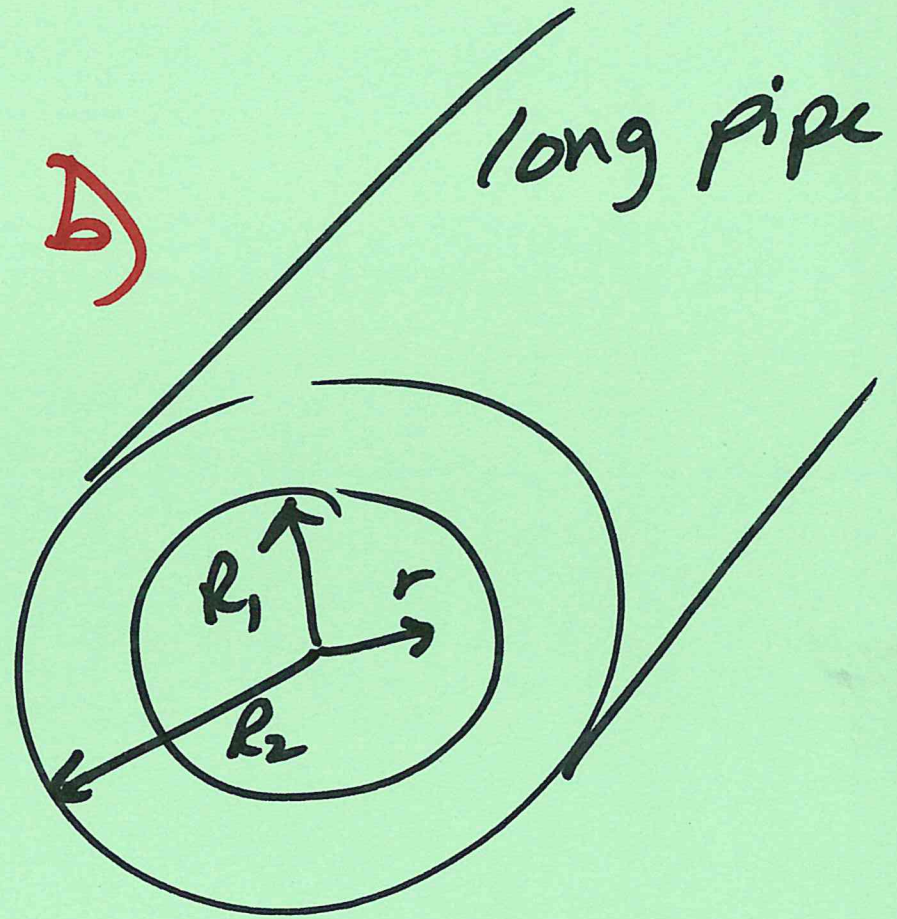
max or min at
 plane of symmetry

5. Physically realizable solns*

e.g. $T = (\alpha)r + \frac{C_1}{r}$ at $r=0 \Rightarrow C_1=0$
 $\rightarrow r$ $T = \text{finite}$



$r=0$ is in the domain



domain: $r_1 \leq r \leq r_2$

$r=0$ is NOT in the domain //

7