PROBLEM 3

$Length := 10 \qquad BNp := 80 \qquad pc := 20 \cdot 10^{12} \qquad c := 2.9979 \cdot 10^{8}$

$q := 1.602 \cdot 10^{-19} \qquad Kappa := \frac{q}{q} \cdot BNp \cdot \frac{c}{pc} \qquad Kappa = 1.199 \times 10^{-3}$

$kappa := \sqrt{Kappa} \qquad kappa = 0.035$

$finv := Kappa \cdot Length \qquad finv = 0.012 \qquad \mu := kappa \cdot Length \qquad \mu = 0.346$

$$Mthick := \begin{pmatrix} \cos(\mu) & \frac{\sin(\mu)}{kappa} & 0 & 0 \\ -kappa \cdot \sin(\mu) & \cos(\mu) & 0 & 0 \\ 0 & 0 & \cosh(\mu) & \frac{\sinh(\mu)}{kappa} \\ 0 & 0 & kappa \cdot \sinh(\mu) & \cosh(\mu) \end{pmatrix} \qquad Mthin := \begin{pmatrix} 1 & 0 & 0 & 0 \\ -finv & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & finv & 1 \end{pmatrix}$$

$$Mthick = \begin{pmatrix} 0.941 & 9.801 & 0 & 0 \\ -0.012 & 0.941 & 0 & 0 \\ 0 & 0 & 1.061 & 10.201 \\ 0 & 0 & 0.012 & 1.061 \end{pmatrix} \qquad Mthin = \begin{pmatrix} 1 & 0 & 0 & 0 \\ -0.012 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0.012 & 1 \end{pmatrix}$$

$|Mthick| = 1 \qquad |Mthin| = 1$

$$Mthino2 := \begin{pmatrix} 1 & 0 & 0 & 0 \\ \frac{-finv}{2} & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & \frac{finv}{2} & 1 \end{pmatrix} \qquad Mlength := \begin{pmatrix} 1 & Length & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & Length \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$Mthinlength := Mthino2 \cdot Mlength \cdot Mthino2$

$$Mthick = \begin{pmatrix} 0.941 & 9.801 & 0 & 0 \\ -0.012 & 0.941 & 0 & 0 \\ 0 & 0 & 1.061 & 10.201 \\ 0 & 0 & 0.012 & 1.061 \end{pmatrix} \qquad Mthinlength = \begin{pmatrix} 0.94 & 10 & 0 & 0 \\ -0.012 & 0.94 & 0 & 0 \\ 0 & 0 & 1.06 & 10 \\ 0 & 0 & 0.012 & 1.06 \end{pmatrix}$$

PROBLEM 5

$$\text{TraceO2}(\mu) := \cosh(\mu)\cdot\cos(\mu) \qquad \text{detm} := 1$$

$$\text{lambda}(\mu) := \text{TraceO2}(\mu) + \sqrt{\text{TraceO2}(\mu)^2 - \text{detm}}$$

$$\text{Rlambda}(\mu) := \text{Re}(\text{lambda}(\mu)) \qquad \text{Ilambda}(\mu) := \text{Im}(\text{lambda}(\mu))$$

$$\text{Ilambda}(1.8723) = 0.152$$