CAPSTONE ASSIGNMENT 27-04-2020

Given that Flow into the capillary is determined by:

$$\frac{dq}{dx} = K_f\left(-P_e + P_i + \pi_e - \pi_i\right)$$

where K_f is the capillary filtration rate,

and the hydrostatic pressure P_e is given as:

$$\frac{dP_e}{dx} = -\rho q$$

using the BC: $q(0) = q(L) = Q_i$

Show that:

$$q = B\,\text{Cosh}\left[\beta\left(x - L/2\right)\right]$$

Note: $B = \dfrac{Q_i}{\text{Cosh}(\beta L/2)}$; $\beta = \left[K_f \rho\right]^{1/2}$

for $q(0) = q(L)$ and symmetric at $x = L/2$.

Instruction: use detail analysis of differential calculus in your approach to this question