Problem 10.6

Slab fuel element between two thin plates of cladding

- ***Initial porosity = P_o***
- ***Power density before restructuring is H_o***

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a.) Find the value of the heat generation rate such that the center temperature just equals the melting temperature. Assume,

$$k_0 = k_s\left(1 - P^{\frac{2}{3}}\right)$$

using

$$k_0\left(\frac{d^2T}{dx^2}\right) + H_0 = 0$$

or,

$$\frac{dT}{dx} = -\left(\frac{H_o}{k_o}\right)x + A \qquad \text{but } \frac{dT}{dx} = 0$$

$$@\ x=0,\ \text{so } A=0$$

then,

$$T = -\left(\frac{H_o}{2k_o}\right)x^2 + B \qquad @\ x = L,\ T = T_s$$

$$\text{so } \quad B = T_s + \frac{H_o}{2k_o}L^2$$