

Exercise 1.4.2

Consider the equilibrium temperature distribution for a uniform one-dimensional rod with sources $Q/K_0 = x$ of thermal energy, subject to the boundary conditions $u(0) = 0$ and $u(L) = 0$.

- (a) Determine the heat energy generated per unit time inside the entire rod.
- (b) Determine the heat energy flowing out of the rod per unit time at $x = 0$ and at $x = L$.
- (c) What relationships should exist between the answers in parts (a) and (b)?