

Summary:

These calculations found the heat transfer rate & temperature for a hemispherical fuel element w/ changing thermal conductivity & heat generation, using the steady state differential equation & integrating to find the heat transfer expression, & based on the final expression a unit analysis was done to ensure accuracy. Applying the $q_o = 0$ case proves to make sense when testing zero heat transfer generation.

Materials:

- Too - ambient air
- hemispherical fuel element (special material)

Analysis:

Due to both thermal conductivity & heat generation change inversely w/ r^2 , the equation simplifies to a constant term of $\frac{d^2T}{dr^2} = -\frac{q_o}{k_o}$, meaning any increase will cause a linear raise to inner temps & need additional cooling on outer surface.