

Exercise 42

A sphere with radius 1 m has temperature 15°C . It lies inside a concentric sphere with radius 2 m and temperature 25°C . The temperature $T(r)$ at a distance r from the common center of the spheres satisfies the differential equation

$$\frac{d^2T}{dr^2} + \frac{2}{r} \frac{dT}{dr} = 0$$

If we let $S = dT/dr$, then S satisfies a first-order differential equation. Solve it to find an expression for the temperature $T(r)$ between the spheres.