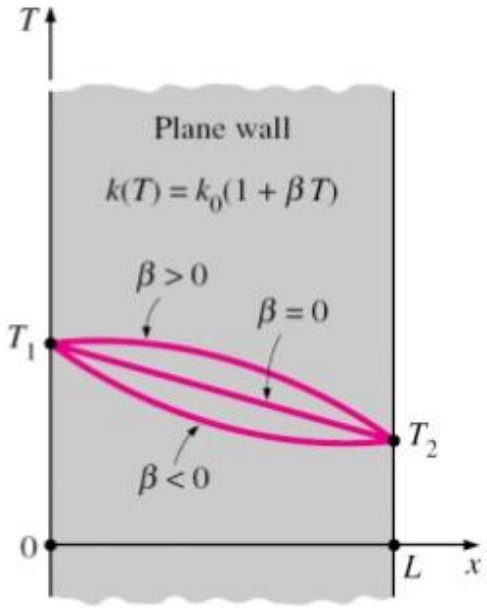
Variable Thermal Conductivity

- For a plane wall the temperature varies linearly during steady one-dimensional heat conduction when the thermal conductivity is constant.
- This is no longer the case when the thermal conductivity changes with temperature (even linearly).



6. Effect of variable thermal conductivity:

- When the k of a material varies rapidly with temperature or when the temperature range of operation is large, it becomes necessary to take into account the variation of k with temperature.
- Generally, k varies with temperature linearly as follows:

$$k(T) = k_o (1 + \beta T) \quad .....(4.67)$$

where, k_o = thermal conductivity at 0 deg. C

β = temperature coefficient of thermal conductivity

T = temperature above 0 deg. C