

Answer on Question #43773 – Physics - Solid State Physics

Why Young's Modulus is directly related with temperature? What is relation of Young's Modulus with temperature? Tell me basic concepts about it. I need Undergraduate level answer.

Solution:

Basic concepts about relation of Young's Modulus with temperature: the force holding atoms together in bonds decreases as the bond length increases, which happens during thermal expansion. This force is the origin of the macro-scale elastic modulus.

The temperature dependence is very well described over the whole temperature range by $T \exp(-\frac{T_0}{T})$, where T_0 is an empirical parameter.