

7.6: More Realistic Models

7.4 Debye frequency

In the Debye model, a solid with average sound speed c_s has density of normal-mode frequencies

$$G(\omega) = \begin{cases} \frac{3V}{2\pi^2 c_s^3} \omega^2 & \text{for } \omega < \omega_D \\ 0 & \text{for } \omega > \omega_D \end{cases} . \quad (7.6.1)$$

Find a formula for $\omega_D(N, V, c_s)$, and write $G(\omega)$ in terms of ω_D .

7.5 Debye model energy and heat capacity

Find $E(T, V, N)$ and $C_V(T, V, N)$ for a harmonic solid in the Debye model, in terms of ω_D and the function

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