

Reading: Finish Chapter 5 of ISSP

- (25) 1. From Ibach and Luth: Calculate the eigenfrequency of a mass defect $M \neq m$ in a linear chain at the position $n = 0$ by invoking the ansatz $s_n = s_0 e^{-k(\omega)|n| - i\omega t}$ for the displacements. For which range of M do localized vibrations exist? [That is, consider an infinite monatomic chain consisting of particles of mass m connected to nearest neighbors with spring constant C , with the exception of one particle which has a mass M . This is a simple example of defect induced localized states in a crystal.]
- (25) 2. ISSP, Ch. 5, Problem 1
- (25) 3. ISSP, Ch. 5, Problem 2 (The bulk modulus B is defined by the relation $U = \frac{1}{2} B \delta^2$, where U is the energy of a solid and $\delta = \frac{V' - V}{V} = \frac{\Delta V}{V}$ is the dilation. See page 80 of ISSP.) Also, (c) Estimate the Debye-Waller factor for the first non-zero diffraction beam.
- (25) 4. ISSP, Ch. 5, Problem 3.