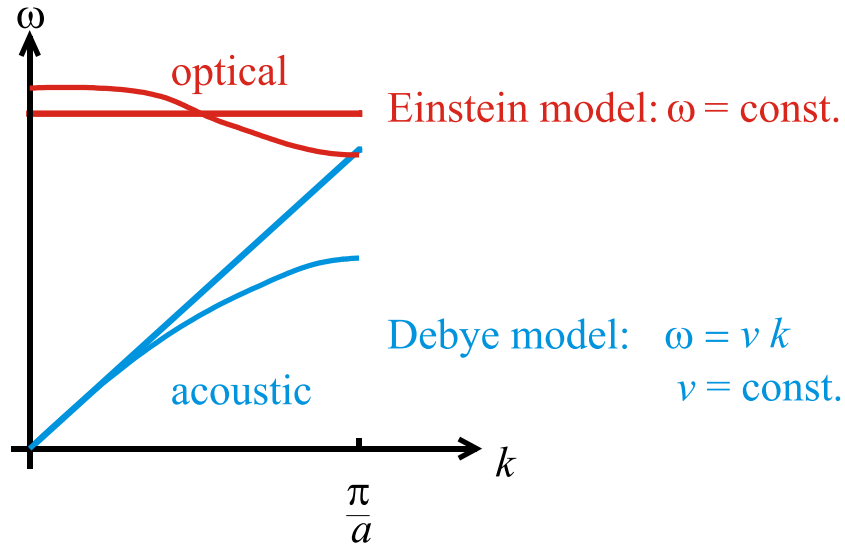


3.5 Simple approximations for lattice vibrations

The optical and acoustic branch of the phonon dispersion relation are displayed in the following figure:



For further simplification we approximate both branches:

- The phonons with a weak dependence on k are approximated by $\omega = \text{const.}$ (Einstein model).
- The phonons with a linear dependence for small k values are approximated by $\omega = vk$ (Debye model).