HAMILTONIANS WITH COMPLEX PERIODIC POTENTIALS BUT REAL ENERGY SPECTRA

JAKUB BORKOWSKI

UNIVERSITY OF WROCŁAW

OVERVIEW OF THE MODEL

We consider a modified Kronig–Penney potential with PT symmetry. The potential has the form:

$$V(x) = \sum_{n=-\infty}^{\infty} \alpha\, e^{(-1)^n i\theta}\, \delta(x - na - \frac{a}{2}).$$

For selected values of the phase θ, we analyze the resulting dispersion relations, eigenstates, and density of states.

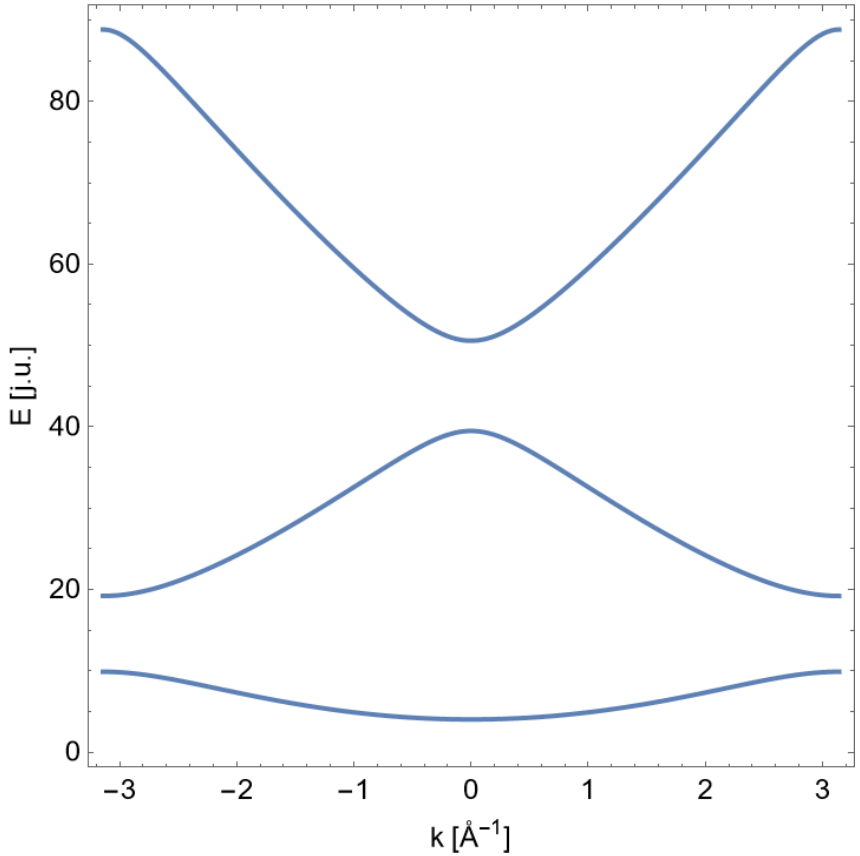

Figure 1. Example dispersion relations E = E(k) for an unmodified Kronig–Penney potential in the first Brillouin zone.

BAND STRUCTURE ANALYSIS

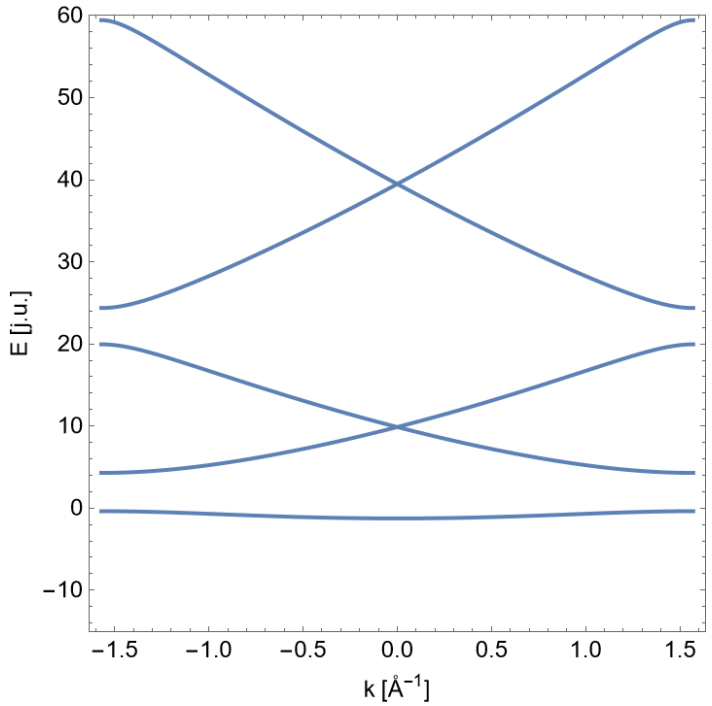

Figure 2. Example dispersion relations E = E(k) for an alternating real potential in the first Brillouin zone.

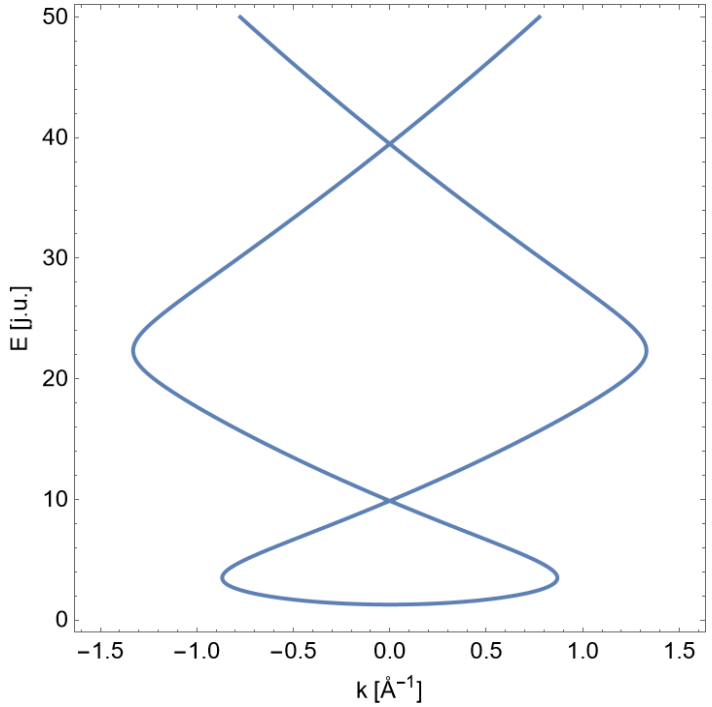

Figure 3. Example dispersion relations E = E(k) for a purely imaginary periodic potential in the first Brillouin zone.

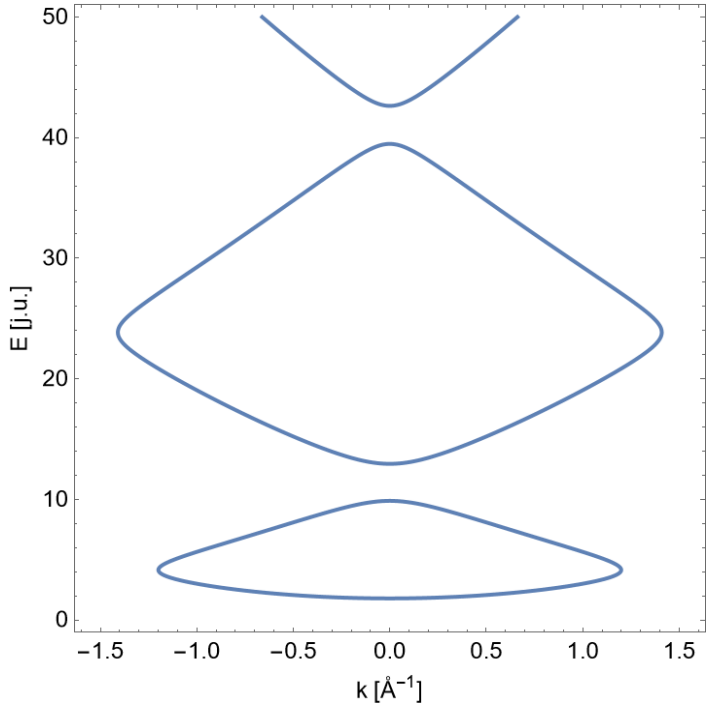

Figure 4. Example dispersion relations E = E(k) for a complex periodic potential with θ = π/4 in the first Brillouin zone.