

Connection with infinite arrays: Rayleigh–Bloch waves

Rayleigh–Bloch waves

- Rayleigh–Bloch waves propagate along infinite arrays.
 - Decay exponentially away from array, i.e. “array bound”.
- Wavenumber $\beta \in \mathbb{R}$: $k < \beta < \pi$.
- RB waves “cut-off” for $k = k_c < \pi$.
- Incident waves cannot excite RB waves on infinite arrays.

Resonances on finite arrays

- Incident waves excite RB waves on finite arrays.
 - RB waves reflect off array ends.
 - Resonances due to constructive interactions between reflected RB waves.
- Resonance occurs for $k \approx k_c$ and $\beta \approx \pi$.
- Explains primary resonance ($k < \pi$) but not higher-order resonances ($k > \pi$).

Resonant structure: $N = 9$ (blue); $N = 1$ (red)

