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One-dimensional quasicrystalline-generated structured waveguides: Kohmoto’s invariant and scaling properties of the dynamic spectra

The talk refers to a detailed investigation of scaling and self-similarity of the dynamic spectra of axial waveguides composed of repeated elementary cells designed by adopting the class of quasicrystalline Fibonacci substitution rules corresponding to the so-called *precious means*. For this family, an invariant function of the circular frequency, the *Kohmoto's invariant*, governs self-similarity and scaling of the stop/pass band layout within defined ranges of frequencies at increasing generation index. In particular, two types of scaling are obtained: a local one, involving only specific stop bands, and a global one, involving large ranges of frequencies. The Kohmoto's invariant also explains the existence of specific frequencies, named *canonical frequencies*, associated with closed orbits on the geometrical three-dimensional representation of the invariant.

References

Gei, M., Wave propagation in quasiperiodic structures: stop/pass band distribution and prestress effects, International Journal of Solids and Structures 47, 3067-3075 (2010).
Morini, L., Gei, M., Waves in one-dimensional quasicrystalline structures: dynamical trace mapping, scaling and self-similarity of the spectrum, Journal of the Mechanics and Physics of Solids 119, 83-103 (2018).