

DOMAINS WITH SMALL RESONATORS AND WHAT ONE CAN DO WITH THEM

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It is known that attaching to a fix domain Ω a small resonator – a set consisting of small set (“room”) and a narrow “passage” connecting this room with Ω – one can drastically change its spectral properties. Also, domains with such (or similar) resonators are widely used in spectral theory and the theory of Sobolev spaces in order to demonstrate various peculiar effects. In this talk we demonstrate how such domains can be used

- for the construction of an unbounded waveguide-like domain such that the eigenvalues of the Neumann-Dirichlet Laplacian on this domain lying below the essential spectrum threshold coincide with prescribed numbers [1],
- for the construction of a \mathbb{Z}^n -periodic domain such that the spectral gaps of the Neumann Laplacian on this domain are close to prescribed intervals [2], and
- for the approximation of $1d$ Schrodinger operators with a δ -potential by the Neumann Laplacian on a narrow waveguide-like domain [3].

REFERENCES

- [1] G. Cardone, A. Khrabustovskyi, Spectrum of the Laplacian on a domain perturbed by small resonators, arXiv:2203.01971.
- [2] A. Khrabustovskyi, E. Khruslov, work in progress.
- [3] A. Khrabustovskyi, O. Post, A geometric approximation of δ -interactions by Neumann Laplacians, J. Phys. A: Math. Theor. 54 (2021), 465201.

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