FINITE SECTIONS OF PERIODIC SCHRÖDINGER OPERATORS

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Abstract. We study discrete Schrödinger operators H on $\ell^p(\mathbb{Z})$, $p \in [1, \infty]$,

$$(Hx)_n = x_{n+1} + x_{n-1} + v(n)x_n\,, \quad n \in \mathbb{Z}\,,$$

with periodic potentials v as they are typically used to approximate aperiodic Schrödinger operators like the Fibonacci Hamiltonian. We prove an efficient test for applicability of the finite section method, a procedure that approximates H by growing finite square submatrices H_n. The study of the applicability of the finite section method also gives further insights on the location of Dirichlet eigenvalues of half-line Schrödinger operators on $\ell^p(\mathbb{Z}_+)$. We show that the finite section method is applicable for integer-valued potentials as soon as H is invertible. We also prove that this statement remains true for $\{0, \lambda\}$-valued potentials with fixed rational λ and period less than nine as well as for arbitrary real-valued potentials of period two. This talk is based on the findings in [1] and [2].

References

[1] F. Gabel, J. Großmann, D. Gallaun, M. Lindner, R. Ukena, *Finite sections of periodic Schrödinger operators*, preprint, 2021, doi:10.48550/arXiv.2110.09339. Submitted to *Operator Theory: Advances and Applications*.

[2] F. Gabel, D. Gallaun, J. Großmann, M. Lindner, and R. Ukena, *Analysis Code for Finite Sections of Periodic Schrödinger Operators*, TUHH Universitätsbibliothek, 2021, doi:10.15480/336.3828.