The limiting absorption principle for periodic differential operators and applications to nonlinear Helmholtz equations

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In this talk I present an L^p-version of the limiting absorption principle for Schrödinger operators with periodic potentials in $\mathbb{R}^d$. Such principles allow to find nontrivial $L^q(\mathbb{R}^d)$-solutions of linear problems

$$-\Delta u + V(x)u - \lambda u = f \qquad \text{in } \mathbb{R}^d$$

for $f \in L^p(\mathbb{R}^d)$, $\lambda \in \sigma_{ess}(-\Delta + V(x))$ and suitable exponents p, q. The main assumptions concern the regularity and curvature properties of the so-called Fermi surfaces of the given Schrödinger operator. The obtained results are applied to the construction of nontrivial solutions of nonlinear Helmholtz equations with periodic coefficients via dual variational methods.

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References

[1] R. Mandel: The limiting absorption principle for periodic differential operators and applications to nonlinear Helmholtz equations, *Preprint*, https://arxiv.org/abs/1710.06332.