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Transmission eigenvalues for higher-order operators and higher-order perturbations

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We extend the theory of transmission eigenvalues for higher-order main terms on three fronts. First, we extend the techniques of Serov and Sylvester to prove discreteness and existence results for transmission eigenvalues for higher-order main terms with singular and degenerate potentials. Second, we extend Sylvester's approach via upper triangular operators to establish the discreteness of transmission eigenvalues for higher-order main terms and higher-order perturbations. Finally, we extend Sylvester's approach to establish discreteness for some magnetic Schrödinger operators.

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ODE solutions for the fractional Laplacian equations arising in conformal geometry

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We construct some ODE solutions for the fractional Yamabe problem in conformal geometry. The fractional curvature, a generalization of the usual scalar curvature, is defined from the conformal fractional Laplacian, which is a non-local operator constructed on the conformal infinity of a conformally compact Einstein manifold. These ODE solutions are a generalization of the usual Delaunay and, in particular, solve the fractional Yamabe problem

$$(-\Delta)^\gamma u = c_{n,\gamma} u^{\frac{n+2\gamma}{n-2\gamma}}, u > 0 \text{ in } r^n \backslash \{0\},$$

with an isolated singularity at the origin. This is a fractional order ODE for which new tools need to be developed. The key of the proof is the computation of the fractional Laplacian in polar coordinates.

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