BAND-GAP SPECTRA OF SOME ELLIPTIC EQUATIONS AND SYSTEMS ON WAVEGUIDES

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Abstract. We consider the band-gap structure of the essential spectrum of some elliptic spectral problems on periodic 2- and 3-dimensional waveguides. In the recent paper with S. Nazarov [1] we study the linearized piezoelectricity system on waveguides with thin structures, which are created by thin ligaments connecting (infinitely many, translated copies of) bounded cells. We establish the existence of an arbitrary number of gaps, if the connecting ligaments of the cells are thin enough. The problem is non-selfadjoint, thus we apply a self-adjoint reduction scheme introduced by Nazarov; also the mere existence of the band-gap structure for the essential spectrum needs a new proof, which we able to provide.

In the work [2] with F. Bakharev we study the linearized elasticity system for waveguides, the geometry of which is similar to the above situation. We perform an asymptotic analysis to obtain quite precise information on the position of the spectral bands.

Finally, in the project [3] we study the Laplace-Dirichlet problem in the plane which is perforated by a periodic lattice of discs with radius \( r > 0 \). Applying Floquet-Bloch-Gelfand-techniques we show that the FBG-eigenvalues depend real analytically on the geometric parameter \( r \). This leads to a non-existence result for eigenvalues of infinite multiplicity.

