

## **Spectral gaps for elastic and piezoelectric waveguides**

Jari Taskinen, University of Helsinki

We consider the band-gap structure of the essential spectrum of linear elasticity and piezoelectricity problems on periodic 3-dimensional waveguides. We consider 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. In the case of the elasticity system we have quite precise information on the position of the spectral bands. The sharpest results are obtained using asymptotic analysis. In the case of the piezoelectricity system, the information is less precise, due to complications of the non-selfadjointness of the problem; the mere existence of the band-gap structure for the essential spectrum needs a new proof, which we are able to provide. Otherwise, the methods include a self-adjoint reduction scheme, max-min-principle and weighted Sobolev estimates.