
CONSTRUCTING SURFACES WITH FIRST STEKLOV EIGENVALUE OF ARBITRARILY LARGE MULTIPLICITY

Samuel Audet-Beaumont

Université Laval

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The Steklov problem offers a wide range of unanswered questions. Amongst them, the study of the multiplicity of the first Steklov eigenvalue remains to be understood. The Steklov case shares some similarities with the classical Laplacian case, one of them being the boundedness of the multiplicity in terms of genus in dimension 2. The general optimal bound still remains to be found in both cases, although some conjectures do exist. The main tools used to prove these results for the Steklov problem are adaptations of the same tools used for the Laplacian, albeit with added complexities. Similarly, we show how to construct a sequence of surfaces with growing genus and first Steklov eigenvalue multiplicity using adaptations of techniques previously used by B. Colbois and P. Buser for the Laplacian. These new constructions show the non-existence of an universal bound, independent of genus, and provide evidence on the possible asymptotical growth of the optimal bound on the multiplicity of the first Steklov eigenvalue.