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Large gaps for Steklov eigenvalues under fixed boundary constraints

Abstract

It is well known that the Steklov spectrum of a manifold with boundary is closely related to the geometry of the boundary. For instance, the spectral asymptotics are completely determined by the geometry in a neighborhood of the boundary. Contrasting this, Colbois, El Soufi, and Girouard [arXiv:1701.04125] recently constructed conformal deformations of a given metric under which the boundary geometry remains fixed, but all non-trivial Steklov eigenvalues tend to infinity. In this talk, I'll present two constructions inspired by the conformal deformations found in [arXiv:1701.04125]. The first is a conformal deformation of a given metric that is localized in an arbitrary neighborhood of the boundary that keeps the boundary geometry fixed. I will show that the boundedness of the Steklov spectrum with regards to these deformations depends on the number of connected components of the domain on which we localize. Secondly, all of the conformal deformations previously mentioned have the peculiar property that the volume tends to infinity (this is a necessary condition for conformal deformations whose Steklov eigenvalues are unbounded). I will present a family of metrics, no longer in the same conformal class, that send the the entire Steklov spectrum to infinity, but keep the boundary geometry and volume fixed. This work is joint with Alexandre Girouard.