A comparison between Neumann and Steklov eigenvalues

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In this talk we present a comparison between the normalized first (non-trivial) Neumann eigenvalue $|\Omega|\mu_1(\Omega)$ for a Lipschitz open set Ω in the plane, and the normalized first (non-trivial) Steklov eigenvalue $P(\Omega)\sigma_1(\Omega)$.

More precisely, we study the ratio $F(\Omega) := |\Omega|\mu_1(\Omega)/P(\Omega)\sigma_1(\Omega)$. We prove that this ratio can take arbitrarily small or large values if we do not put any restriction on the class of sets Ω. Then we restrict ourselves to the class of plane convex domains for which we get explicit bounds. We also study the case of thin convex domains for which we give more precise bounds.

In the last part of the talk we present the corresponding Blaschke-Santaló diagrams $(x, y) = (|\Omega|\mu_1(\Omega), P(\Omega)\sigma_1(\Omega))$ and we state some open problems.

This talk is based on a joint work with Antoine Henrot.