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An upper estimation for the eigenfrequencies of vibrating Liapunoff bodies (first boundary value problem).

G. Pólya [J. Indian Math. Soc. (N.S.) 24 (1960), 413–419; MR0133059 (24 #A2895)] established the upper bound $\Lambda_1 < \pi L/2A$ for the first eigenvalue $\Lambda_1$ of a simply or doubly connected plane membrane of area $A$, fixed along its boundary of length $L$. The present paper is devoted to its extension to “generalized Lyapunov bodies” in $\mathbb{R}^n$ (which include the convex domains), using geometric measure theory. As in Pólya’s paper the proof depends on the “method of interior parallels” initiated by E. Makai [Czechoslovak J. Math. 9(84) (1959), 66–70].

{Reviewer’s remarks: The lower bound referred to in Section 1 is essentially the classical Rayleigh-Faber-Krahn theorem and is valid only for the first eigenvalue $\Lambda_1$. Furthermore, in Theorems 2 and 3, $\Lambda_1$ (instead of $\Lambda_1^2$), which has dimension cm$^{-1}$, should stay on the left side of the inequalities.}

Reviewed by J. Hersch

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