The Mathematics of Music Theory

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A conjecture of Polya and Szego states that among the polygons with the same number of sides and area, the regular polygon minimizes the first eigenvalue of the Dirichlet Laplacian. This conjecture has only been proven in the cases of three and four sides. In this paper introduce a computational approach to checking the Polya-Szego conjecture for five or more sides.

[16%] Assignment Outline

Introduction

Consider the eigenvalue solutions for the Laplace operator with Dirichlet boundary conditions for any open, bounded set $\Omega \subset \mathbb{R}^2$

$$\begin{cases} -\Delta u &= \lambda u \\ u &= 0 \end{cases} \tag{1}$$