1. Eigenvalues for the domain limacon0.8

Radius function:

$$R(\theta) = 0.8 \cos(\theta) + 1$$

Adaptive finite element method of degree 2 with 146054 triangles.

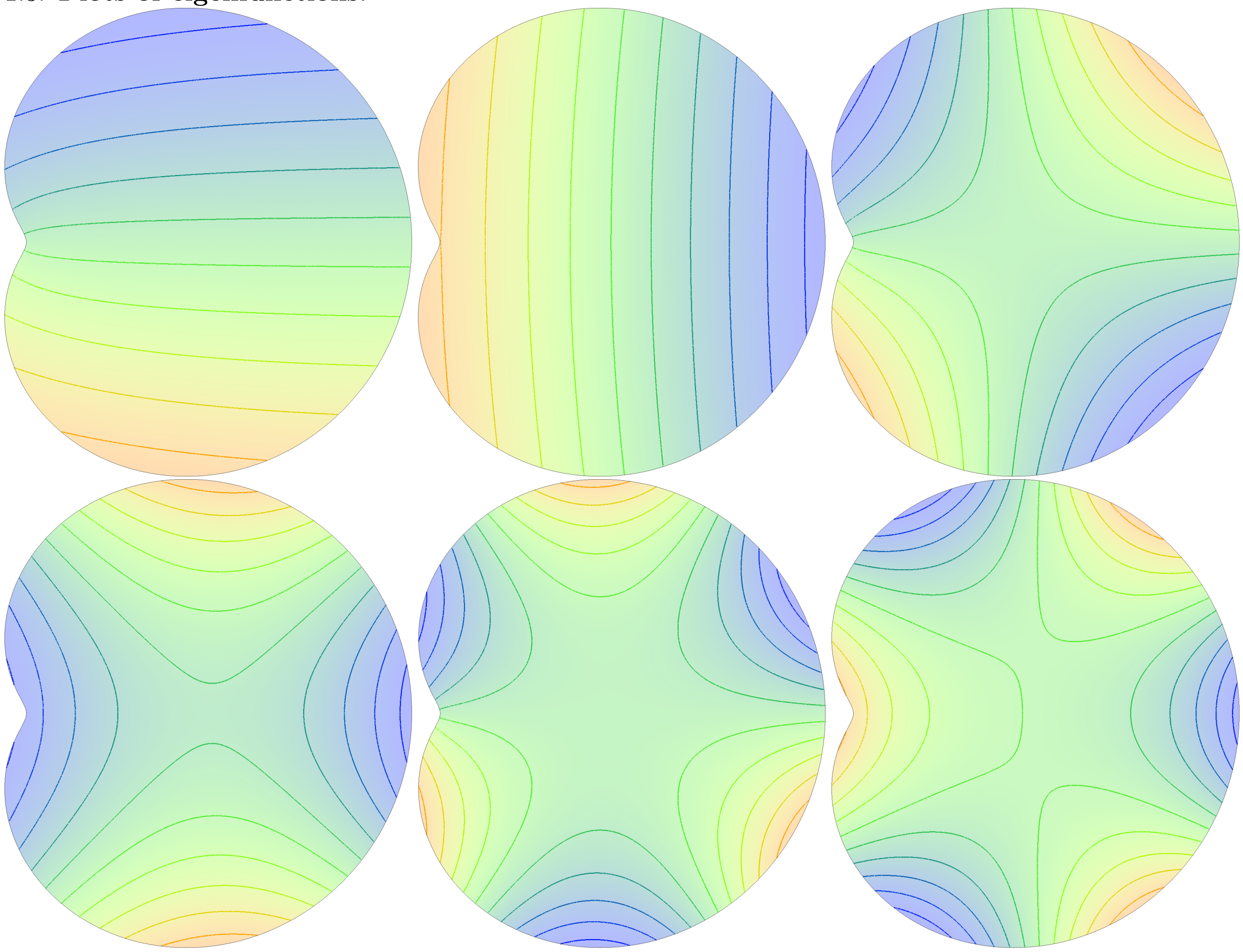
1.1. Geometric quantities (perimeter L and constants g_i). All quantities evaluated using boundary integral for a very fine mesh. For g_i we use geometric representations from Lemma 6.2.

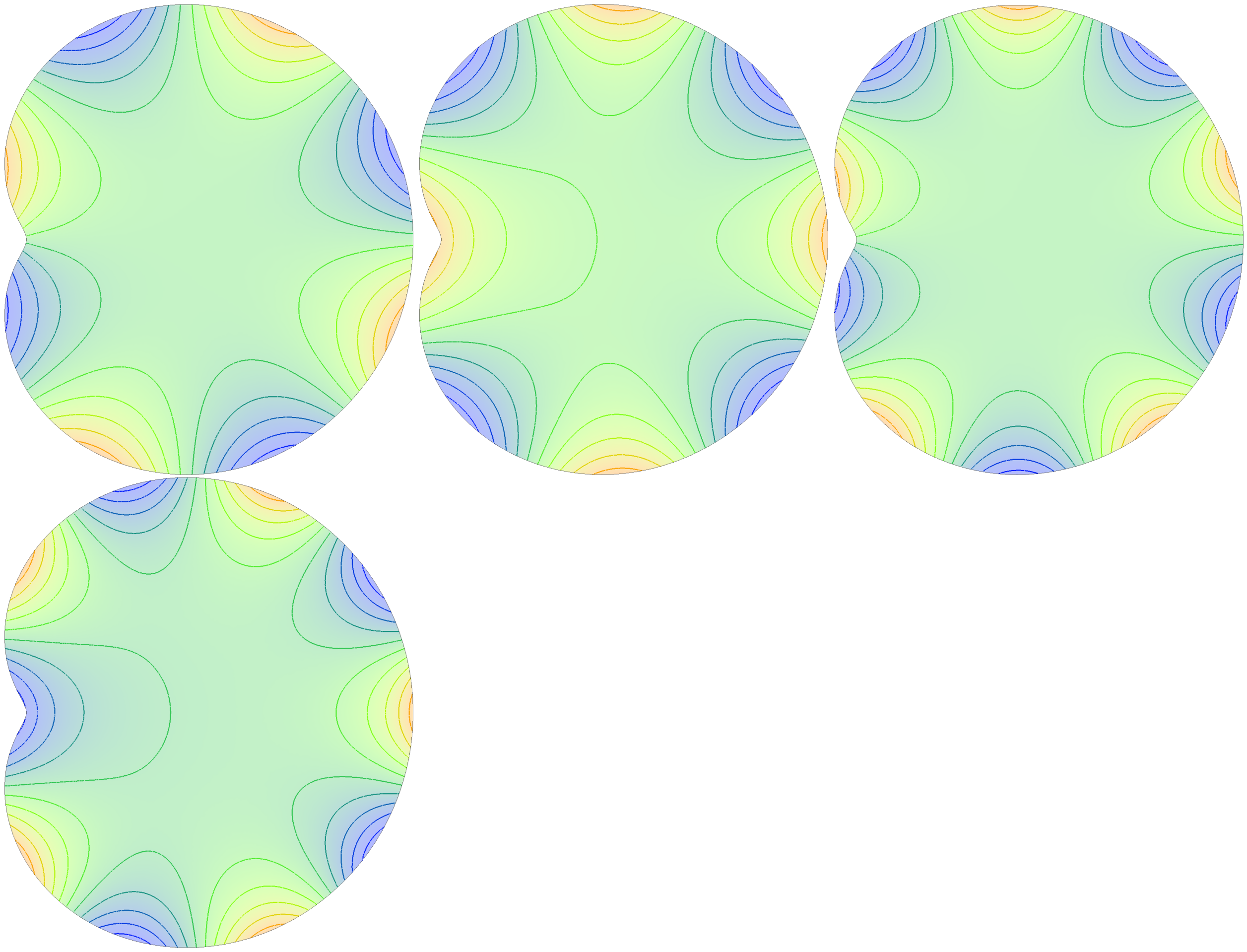
$$L = 7.33756246097 \quad g_0 = 1.6666672118 \quad g_1 = 1.2025411886 \quad g = 1.41571041173$$

1.2. Eigenvalues. Upper bounds are obtained by plugging numerical eigenfunctions into the Rayleigh quotient. Numbers in parentheses are numerical eigenvalues of the discrete problem. Finally ρ_i are the rescaled sums $(\sigma_1 + \cdots + \sigma_n)L$ on the domain divided by the same quantity on the disk.

$\sigma_1 \le 0.761284989331$	(0.761284989447)	$\rho_1 = 0.889035717827$
$\sigma_2 \le 0.938355861994$	(0.938355862201)	$\rho_2 = 0.992428226934$
$\sigma_3 \le 1.62462233344$	(1.62462233399)	$\rho_3 = 0.970526395546$
$\sigma_4 \le 1.80014860157$	(1.80014860185)	$\rho_4 = 0.997389320853$
$\sigma_5 \le 2.48742315693$	(2.48742315707)	$\rho_5 = 0.987685767793$
$\sigma_6 \le 2.65622233766$	(2.65622233782)	$\rho_6 = 0.999261096191$
$\sigma_7 \le 3.34947484828$	(3.34947485308)	$\rho_7 = 0.993917572032$
$\sigma_8 \le 3.51046601383$	(3.51046601454)	$\rho_8 = 1.00011180684$
$\sigma_9 \le 4.21091711485$	(4.2109171152)	$\rho_9 = 0.996791378253$
$\sigma_{10} \le 4.36390514885$	(4.36390514898)	$\rho_{10} = 1.00053312101$

1.3. **Plots of eigenfunctions.**





1.4. **Sizes of mesh triangles and list of other parameters.**

Initial polygon: n sides. Adaptive: try to find 4 eigenfunctions, use at most None. Refine to at least 400000 triangles.

Sizes of mesh triangles after adaptive refinement (blue - small):