Bad packings: the Reinhardt conjecture as an optimal control problem

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Abstract

It is easier to pack some shapes in the plane than others. For example, squares tile the plane with no wasted space, but even the best packing of identical circular disks leaves about 10% of the plane unfilled.

This talk will discuss Reinhardt's problem, which asks for the worst possible centrally symmetric convex shape for packing. In 1934, Reinhardt conjectured that the worst shape is an octagon with smoothed corners. We show how to formulate the problem as an optimal control problem. Optimal control theory gives us a collection of tools that we hope will lead to a solution to the problem.

Here is a blog post by John Baez about the problem: http://blogs. ams.org/visualinsight/2014/11/01/packing-smoothed-octagons/. My recent work is described in a blog post https://jiggerwit.wordpress.com/ 2017/03/05/bad-packings/ and preprint https://arxiv.org/abs/1703. 01352.