
Diagonal changes: a geometric generalization of continued fractions

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Abstract

The (standard) continued fraction is an algorithm that produces for any real number x a fraction of the form $a_0 + \frac{1}{a_1 + \frac{1}{a_2 + \dots}}$ where a_0, a_1, \dots are integers. The finite truncation of this fraction is a rational number. It is well known that the standard continued fraction can also be seen more geometrically as a diagonal change on the space of tori. It encodes the geodesic flow on $SL(2, \mathbb{R}) / SL(2, \mathbb{Z})$ with respect to some fundamental domain.

One possible generalization to higher dimensions is via the diagonal actions on the homogeneous spaces $SL(d, \mathbb{R}) / SL(d, \mathbb{Z})$. We will present another generalization to surfaces of higher genus (that are so called translation surfaces). This generalization

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