## Bounded remainder sets, diophantine equations and balanced words <sup>1</sup>

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## Abstract

Using exchanged toric developments we construct toric tilings into bounded remainder sets in any dimension. For this the following several methods are used:

1) a stretch of the multi-dimensional unit cubes,

2) some general methods of multiplication of the toric developments,

3) sections of bounded remainder sets having larger dimension.

For these bounded remainder sets, a multi-dimensional analogue of the Hecke theorem on the distribution of fraction parts is proved.

In this way, two kinds of diophantine equations appear. One is over quasilattices and the other over usual integer numbers but with respect to the circle-multiplication  $A \circ B$ . Moreover we can add that the well known Fibonacci and Rauzy tilings are living in this context.

The aforementioned bounded remainder sets can be used to generate balanced words over a finite alphabet with a prescribed frequency letters in the words. The method allows to build balanced words with the growing complexity and even words having a positive entropy.

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