

**On the convergence and the periodicity of
 p -adic continued fractions**

Giuliano Romeo

Politecnico di Torino

Continued fractions have been introduced in the field of p -adic numbers with the purpose of reproducing the beautiful properties they enjoy over the real numbers. Classical continued fractions give the best rational approximations for real numbers and they characterize rational numbers and quadratic irrationals through, respectively, the finiteness and the periodicity of the expansions. Unfortunately, in the field of p -adic numbers, there is not a standard algorithm as in \mathbb{R} . In particular, it is not known any algorithm that, at the same time:

- produces a continued fraction that always converges to a p -adic number,
- terminates in a finite number of steps on rational numbers,
- is periodic on every quadratic irrational.

In the first part of the talk we introduce the general framework for the study of continued fractions in the field of p -adic numbers. Then we present some recent results regarding the convergence and the periodicity of continued fractions in \mathbb{Q}_p . In particular, we analyze some necessary and sufficient conditions that an algorithm must fulfill in order to guarantee the convergence of a continued fraction to a p -adic number. Then, we focus on the periodicity of one of the most performing algorithm up to now, i.e. one of the algorithms introduced by Browkin in 2000.