

Generating Expansions in Cantor Real Bases via a Transducer

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Representing real numbers using suitable numeration systems - such as integer bases, beta-expansions, or Cantor bases - has long been a central topic in mathematics. In this talk, I will focus on Cantor real bases, and more specifically on automatic Cantor real bases and the properties of real number expansions in this framework.

I will introduce a single transducer associated with a fixed real number r , which computes the B -expansion of r for an infinite family of Cantor real bases B given as input. This point of view contrasts with traditional computational models, where the numeration system is fixed in advance. Under suitable assumptions on the finitely many Pisot numbers occurring in the Cantor real base, only a finite portion of the transducer is visited. I will then present several fundamental results concerning both the structure of this transducer and decidability questions related to these expansions. In particular, for certain classes of Cantor real bases, important combinatorial properties - such as greediness or periodicity of the expansion - can be decided algorithmically. This talk is based on joint work with Pierre Popoli and Michel Rigo.