

1011-68-292

Jack H. Lutz* (lutz@cs.iastate.edu), Department of Computer Science, 226 Atanasoff Hall, Ames, IA 50011. *Dimensions of Copeland-Erdős Sequences*. Preliminary report.

The base- k *Copeland-Erdős sequence* given by an infinite set A of positive integers is the infinite sequence $\text{CE}_k(A)$ formed by concatenating the base- k representations of the elements of A in numerical order. This talk concerns the *finite-state dimension* $\dim_{\text{FS}}(\text{CE}_k(A))$, the *finite-state strong dimension* $\text{Dim}_{\text{FS}}(\text{CE}_k(A))$, the *zeta-dimension* $\text{Dim}_\zeta(A)$, a kind of discrete fractal dimension discovered many times over the past few decades, and the *lower zeta-dimension* $\dim_\zeta(A)$, a dual of $\text{Dim}_\zeta(A)$. We prove the following.

1. $\dim_{\text{FS}}(\text{CE}_k(A)) \geq \dim_\zeta(A)$. This extends the 1946 proof by Copeland and Erdős that the sequence $\text{CE}_k(\text{PRIMES})$ is Borel normal.
2. $\text{Dim}_{\text{FS}}(\text{CE}_k(A)) \geq \text{Dim}_\zeta(A)$.
3. These bounds are tight in the strong sense that these four quantities can have (simultaneously) any four values in $[0, 1]$ satisfying the four above-mentioned inequalities.

This is joint work with Xiaoyang Gu and Philippe Moser. (Received August 30, 2005)