

We study the multifractal properties of the uniform approximation exponent and the asymptotic approximation exponent in continued fractions. As a corollary, we calculate the Hausdorff dimension of the uniform Diophantine set

$$\{x \in [0,1): \forall N \gg 1, \exists n \in [1, N] \text{ such that } |T^n(x) - y| < |I_N(y)|^{\hat{\nu}}\}$$

for algebraic irrational points $y \in [0,1)$. These results contribute to the study of the uniform Diophantine approximation, and apply to investigating the multifractal properties of run-length function in continued fractions. This is a joint work with Pro. Bo Tan.