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_The Continued Fraction Pendulum_,

**Abstract**

For an irrational number $\alpha$ let $\langle i\alpha \rangle$ denote the fractional part of $i\alpha$ where $i$ is any integer. The three distance theorem states that any $t$ points $\langle i\alpha \rangle$, $1 \leq i \leq t$, partition the unit interval into gaps of at most three distinct lengths. We know that the process of splitting gaps for increasing $t$ swings like an escalating pendulum in the unit interval and we show that the margins are determined by the denominators of the convergents of the continued fraction representation of $\alpha$.

Moreover, for a positive real number $\xi$ the points $((i\alpha), i/\xi)$ provide a strip of a lattice. The main result states that the smallest distance between lattice points is determined by a denominator of a principal convergent. Regarding this and the second smallest distance, lattices are classified into a landscape of phyllotactic patterns.