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An asymmetric version of the Littlewood conjecture

In this talk, we study an asymmetric version of the Littlewood conjecture proposed by Y. Bugeaud. A parameter $\sigma \in [0,1]$ being fixed, we study the set $B(\sigma)$ of those pairs of real numbers (x,y) such that $\inf_{q \geq 1} (q \cdot \max(\|qx\|, \|qy\|)^{1+\sigma} \min(\|qx\|, \|qy\|)^{1-\sigma}) > 0$. Counter-examples to the Littlewood conjecture would belong to $B(0)$ and appear as an interpolation from the set $B(1)$ corresponding to the badly approximable vectors in dimension 2. We prove that for every $\sigma \in [0,1]$, $B(\sigma)$ has Hausdorff dimension 2, and propose some natural conjectures around such sets. Joint work in progress with F. Adiceam.