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Abstract

Most of the work published on Ducci sequences is concerned with finding the behavior of the iterates of the Ducci map. Here we are interested in roughly the opposite. More precisely if T is the Ducci map and $\vec{x}_0 \in \mathbb{N}^k$ for some $k \in \mathbb{N}$, we seek $\vec{x}_1$ such that $T(\vec{x}_1) = \vec{x}_0$ and more generally a sequence $(x_n)_{n\in\mathbb{N}}$ of distinct vectors such that $T(\vec{x}_n) = \vec{x}_{n-1}$ for every $n \geq 1$. We prove that when k is odd, the existence of $\vec{x}_1$ implies the existence of $(x_n)_{n\in\mathbb{N}}$ and when $k = 2^l$ no vector in $\mathbb{N}^k$ has this property. Some other related results are deduced.