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A counter-example to the finiteness conjecture of Kawaguchi and Silverman

Let f be a dominant rational self-map of a smooth projective variety X defined over $\overline{\mathbb{Q}}$. For each point $P \in X(\overline{\mathbb{Q}})$ whose forward f-orbit is well-defined, Silverman introduced the arithmetic degree $\alpha_f(P)$, which measures the growth rate of the heights of the points $f^n(P)$. Kawaguchi and Silverman conjectured that $\alpha_f(P)$ is well-defined and that, as P varies, the set of values obtained by $\alpha_f(P)$ is finite. Based on constructions of Bedford–Kim and McMullen, we give a counterexample to this conjecture when $X = \mathbb{P}^4$. This is joint work with John Lesieutre.