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Arboreal finite index for cubic polynomials

Let K be a global field of characteristic 0. Let $f \in K[x]$ and $\beta \in K$, and set $K_n = K(f^{-n}(\beta))$. The projective limit of the groups $\text{Gal}(K_n/K)$ embeds in the automorphism group of an infinite rooted tree. A major problem in arithmetic dynamics is to find conditions that guarantee the index is finite; a complete answer would give a dynamical analogue of Serre's celebrated open image theorem. I solve the finite index problem for cubic polynomials over function fields by proving a complete list of necessary and sufficient conditions. For number fields, the proof of sufficiency is conditional on both the *abc* conjecture and a form of Vojta's conjecture. This is joint work with Tom Tucker.