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The arboreal Galois representation of a PCF cubic polynomial

Let K be a field, $f(x)$ a polynomial of degree $d > 1$ with coefficients in K , and $a \in K$. The roots of the polynomials $f^n(x) - a$, which are the pre-images of a under $f^n(x)$, have a natural structure as a d -ary rooted tree. We can study the action of the absolute Galois group of K on this tree structure. For a generic polynomial, this will give the full automorphism group of the tree. However in certain cases, such as when the polynomial is post-critically finite, this representation is known to have infinite index. In this talk, we will give a complete description of this group for the polynomial $f(x) = -2x^3 + 3x^2$ and base point $a = 3$ over the rational numbers. This is joint work with Rob Benedetto, Xander Faber, Ben Hutz, and Yu Yasufuku.