ON THE EQUATION $f(g(x)) = f(x)h^m(x)$ FOR COMPOSITE POLYNOMIALS

Abstract. In recent past we were interested to study some special composition of polynomial equation $f(g(x)) = f(x)h^m(x)$ where f, g and h are unknown polynomials with coefficients in arbitrary field K, f is non-constant and separable, $\deg g \geq 2$, $g' \neq 0$ and the integer power $m \geq 2$ is not divisible by the characteristic of the field K. In this talk we prove that this equation has no solutions if $\deg f \geq 3$. If $\deg f = 2$, we prove that $m = 2$ and give all solutions explicitly in terms of Chebyshev polynomials. The diophantine applications for such polynomials f, g, h with coefficients in $\mathbb{Q}$ or $\mathbb{Z}$ are considered in the context of the conjecture of Cassaigne et. al. on the values of Louiville's λ function at points $f(r)$, $r \in \mathbb{Q}$. This is joint work with Jonas Jankauskas.