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Dimension Quasi-polynomials of Inversive Difference Field Extensions with Weighted Translations.

Let K be an inversive difference field with basic translations $\sigma_1, \dots, \sigma_m$ that are assigned positive integer weights w_1, \dots, w_m , respectively. Let Γ denote the set of all power products $\tau = \sigma_1^{k_1} \dots \sigma_m^{k_m}$ ($k_i \in \mathbb{Z}$), let the order of such a power product be defined as $ord_w \tau = \sum_{i=1}^m w_i |k_i|$, and for every $r \in \mathbb{N}$, let $\Gamma(r) = \{\tau \in \Gamma \mid ord_w \tau \leq r\}$. We prove that if L is a finitely generated inversive difference field extension of K with a set of difference generators $\eta = \{\eta_1, \dots, \eta_n\}$, then the function $\phi_\eta(r) = tr.deg_K K(\cup_{i=1}^n \Gamma(r)\eta_i)$ is a quasi-polynomial in r that can be expressed as an alternating sum of certain Ehrhart quasi-polynomials. We also determine some difference birational invariants of this quasi-polynomial and give a generalization of the obtained results to the case of multivariate dimension quasi-polynomials associated with partitions of the set of basic translations. (Received March 13, 2017)