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In this talk, based on the joint work [1], we study Waring numbers $g_R(k)$ for (R, \mathfrak{m}) a finite commutative local ring with identity and $k \in \mathbf{N}$ with $(k, |R|) = 1$. We first relate the Waring number $g_R(k)$ with the diameter of the Cayley graphs $G_R(k) = \text{Cay}(R, U_R(k))$ and $W_R(k) = \text{Cay}(R, S_R(k))$ with $U_R(k) = \{x^k : x \in R^*\}$ and $S_R(k) = \{x^k : x \in R^\times\}$, distinguishing the cases where the graphs are directed or undirected. We show that in both cases (directed or undirected), the graph $G_R(k)$ can be obtained by blowing-up the vertices of $G_{\mathbf{F}_q}(k)$ a number $|\mathfrak{m}|$ of times, with independence sets the cosets of \mathfrak{m} , where q is the size of the residue field R/\mathfrak{m} .

Then, by using the above blowing-up, we reduce the study of the Waring number $g_R(k)$ over the local ring R to the computation of the Waring number $g(k, q)$ over the finite residue field $R/\mathfrak{m} \simeq \mathbf{F}_q$. In this way, using known results for Waring numbers over finite fields, we obtain several explicit results for Waring numbers over finite commutative local rings with identity.

Trabajo en conjunto con Denis E. Videla (Universidad Nacional de Córdoba, FaMAF, CIEM-CONICET).

Referencias

- [1] Ricardo A. Podestá, Denis E. Videla. *Waring numbers over finite commutative local rings*, *Discrete Mathematics* **346:10**, 10/2023, Art ID 113567, 22 págs., <https://doi.org/10.1016/j.disc.2023.113567>, (arXiv:2212.1239, 12/2022).