Construction of Small Regular Graphs of Girth 7

Marién Abreu
Dipartimento di Matematica, Informatica ed Economia
Università degli Studi della Basilicata, Italy
marien.abreu@unibas.it

Coauthors: G. Araujo-Pardo, C. Balbuena,
D. Labbate and J. Salas

In this talk, we present constructions for new infinite families of regular graphs of girth 7 of smallest order known so far. Our constructions are based on combinatorial and geometric properties of $(q+1;8)$–cages, for q a prime power. We remove vertices from such cages and add matchings among the vertices of minimum degree to achieve regularity in the new graphs. We obtain the following results:

Theorem *Let $q \geq 4$ be an even prime power. Then, there is a $(q+1)$–regular graph of girth 7 and order $2q^3 + q^2 + 2q$.*

Theorem *Let $q \geq 5$ be an odd prime power. Then, there is a $(q+1)$–regular graph of girth 7 and order $2q^3 + 2q^2 - q + 1$.*

.