

Wiam Belkouche

Hassan II University of Casablanca

ON A PROBLEM OF FRANKL AND FÜREDI

In this talk, we address the following problem due to Frankl and Füredi [2]. What is the maximum number of hyperedges in an r -uniform hypergraph with n vertices, such that every set of $r+1$ vertices contains 0 or 2 hyperedges? They solved this problem for $r = 3$. For $r = 4$, a partial solution is given by Gunderson and Semeraro [3] when $n = q + 1$ for some prime power $q \equiv 3 \pmod{4}$. Assuming the existence of skew-symmetric conference matrices for every order divisible by 4, based on our results in [1], we give a solution for $n \equiv 0 \pmod{4}$ and for $n \equiv 3 \pmod{4}$. This problem is linked to the question of determining the maximum number of diamonds in a tournament.

This is joint work with Abderrahim Boussaïri, Soufiane Lakhli and Mohammed Zaidi.

References

- [1] W. Belkouche, A. Boussaïri, S. Lakhli, and M. Zaidi, *Matricial characterization of tournaments with maximum number of diamonds*, Discrete Mathematics, 343(4), 2020, p. 111699.
- [2] P. Frankl, Z. Füredi, *An exact result for 3-graphs*, Discrete Mathematics, 50, 1984, pp. 323-328.
- [3] K. Gunderson and J. Semeraro, *Tournaments, 4-uniform hypergraphs, and an exact extremal result*, Journal of Combinatorial Theory B, 126, 2017, p. 125.