

# Transversal Hamilton paths and cycles of arbitrary orientations in tournaments

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It is well-known that a tournament always contains a directed Hamilton path. Rosenfeld conjectured that if a tournament is sufficiently large, it contains a Hamilton path of any given orientation. This conjecture was approved by Thomason, and Havet and Thomassé completely resolved it by showing there are exactly three exceptions.

We generalized this result into a transversal setting. Let  $\mathbf{T} = \{T_1, \dots, T_{n-1}\}$  be a collection of tournaments on a common vertex set  $V$  of size  $n$ . We showed that if  $n$  is sufficiently large, there is a Hamilton path on  $V$  of any given orientation which is obtained by collecting exactly one arc from each  $T_i$ . Such a path is said to be *transversal*.

It is also a folklore that a strongly connected tournament always contains a directed Hamilton cycle. Rosenfeld made a conjecture for arbitrarily oriented Hamilton cycles in tournaments as well, which was approved by Thomason (for sufficiently large tournaments) and Zein (by specifying all the exceptions). We also showed a transversal version of this result. Together with the aforementioned result, it extends our previous research, which is on transversal generalizations of existence of directed paths and cycles in tournaments.

This is a joint work with Debsoumya Chakraborti, Jaehoon Kim, and Hyunwoo Lee.

**Primary authors:** LEE, Hyunwoo (KAIST & IBS ECOPRO); CHAKRABORTI, Debsoumya (University of Warwick); Prof. KIM, Jaehoon (KAIST); SEO, Jaehyeon (Yonsei University)

**Presenter:** SEO, Jaehyeon (Yonsei University)

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