

# Maximum number of triangle-free edge colorings

Hiệp Hàn

## Abstract

A coloring of the edges of a graph  $G$  with  $r$  colors is called a  $K_k$ -free  $r$ -coloring if it induces no monochromatic copy of  $K_k$ , the clique on  $k$  vertices. For  $k \geq 3$  and  $r \in \{2, 3\}$  Alon, Balogh, Keevash and Sudakov showed that among all graphs on  $n > n_0(k)$  vertices the balanced  $(k - 1)$ -partite graph and only this graph admits the maximum number of distinct  $K_k$ -free  $r$ -colorings. For triangles and two colors this was conjectured by Erdős and Rothschild and previously confirmed by Yuster.

For  $r > 3$  the problem becomes much harder and is only resolved for  $r = 4$  and  $k \in \{3, 4\}$ . In our work, we address the problem for triangles and  $r \in \{5, 6\}$ .

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