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*Regularity of powers of edge ideals: from local properties to global bounds.*

Let  $I = I(G)$  be the edge ideal of a graph  $G$ . We give various general upper bounds for the regularity function  $\text{reg } I^s$ , for  $s \geq 1$ , addressing a conjecture made by the authors and Alilooee. When  $G$  is a gap-free graph and locally of regularity 2, we show that  $\text{reg } I^s = 2s$  for all  $s \geq 2$ . This is a slightly weaker version of a conjecture of Nevo and Peeva. Our method is to investigate the regularity function  $\text{reg } I^s$ , for  $s \geq 1$ , via local information of  $I$ . (Received August 16, 2018)