

## Spectrum of the Szlam Numbers of the Plane

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Suppose that the plane  $\mathbb{R}^2$  is equipped with a translation invariant distance function  $\rho$  and suppose that  $d > 0$ . The distance graph  $G_\rho(\mathbb{R}^2, d)$  is the graph with vertex set  $\mathbb{R}^2$  with  $u, v \in \mathbb{R}^2$  adjacent if and only if  $\rho(u, v) = d$ . A rather red coloring of  $G$  is a coloring of  $\mathbb{R}^2$  with red and blue such that no two points adjacent in  $G$  are both blue. The Szlam number of  $G$  is the minimum cardinality, over all rather red colorings of  $G$ , of  $X \subseteq \mathbb{R}^2$  such that no translate of  $X$  is all red. Fixing  $d = 1$ , we exploit results of Johnson, Szlam, and Kloeckner to show that for every positive integer  $n$  there exists  $\rho$  such that the Szlam number of  $G_\rho(\mathbb{R}^2, 1)$  is  $n$ .

Keywords: Distance Graphs, Euclidean Coloring Problem, Szlam Number