

1143-05-155

**Deborah Oliveros, Christopher O'Neill and Shira Zerbib\*** (zerbib@umich.edu),  
Department of Mathematics, University of Michigan, Ann Arbor, MI 48109. *The geometry and combinatorics of discrete line segment hypergraphs.*

An  $r$ -segment hypergraph  $H$  is a hypergraph whose edges consist of  $r$  consecutive integer points on line segments in  $\mathbb{R}^2$ . We bound the chromatic number  $\chi(H)$  and covering number  $\tau(H)$  of hypergraphs in this family, uncovering several interesting geometric properties in the process. For  $r \geq 3$  we conjecture that  $\tau(H) \leq (r - 1)\nu(H)$ , where  $\nu(H)$  denotes the matching number of  $H$ . We prove our conjecture in the case where  $\nu(H) = 1$ , and provide improved optimal bounds on  $\tau(H)$  for  $r \leq 5$ . We also provide sharp bounds on the chromatic number  $\chi(H)$  in terms of  $r$ , and use them to prove two fractional versions of our conjecture. (Received August 08, 2018)