Cleveland State University
College of Science

COLLOQUIUM

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Plücker-type Inequalities for Mixed Areas and Intersection Numbers of Curve Arrangements

Friday Sept. 15th at 2:30pm in RT 1516

Bio: Dr. Averkov received his Ph.D. in 2004 from TU Chemnitz (Germany). He then went on to a postdoctoral position at the University of Florence (Italy) in 2005. Then he took a postdoc position in Algorithmic Mathematics at Magdeburg University in Germany in 2006, which later became a position as an Assistant Professor then Associate Professor at the same university. Since 2019, he has had the appointment of Professor of Algorithmic Mathematics at BTU Cottbus in Germany. He research interests include convex geometry, geometry of lattices and lattice polytypes, real algebra, integer optimization, semidefinite optimization and computer-assisted proof approaches.

Abstract: Any collection of n compact convex planar sets $K_1, \ldots, K_n$ defines a vector of $\binom{n}{2}$ mixed areas $V(K_i, K_j)$ for $1 \leq i < j \leq n$. We show that for $n \geq 4$ these numbers satisfy certain Plücker-type inequalities. Moreover, we prove that for $n = 4$ these inequalities completely describe the space of all mixed area vectors $(V(K_i, K_j) : 1 \leq i < j \leq 4)$. For arbitrary $n \geq 4$ we show that this space has a semi-algebraic closure of full dimension. As an application, we show that the pairwise intersection numbers of any collection of n tropical curves satisfy the Plücker-type inequalities. Moreover, in the case of four tropical curves, any homogeneous polynomial relation between their six intersection numbers follows from the corresponding Plücker-type inequalities.

Refreshments will be served in RT 1517 at 2:10pm