

Lethbridge Number Theory and Combinatorics Seminar

Monday — September 25, 2017

Room: C630

Time: 12:00 to 12:50 p.m.

Muhammad Khan

The contact graphs of totally separable packings

Abstract: Contact graphs have emerged as an important tool in the study of translative packings of convex bodies and have found numerous applications in materials science. The contact number of a packing of translates of a convex body is the number of edges in the contact graph of the packing, while the Hadwiger number of a convex body is the maximum vertex degree over all such contact graphs. In this talk, we investigate the Hadwiger and contact numbers of totally separable packings of convex bodies, known as the separable Hadwiger number and the separable contact number, respectively. We show that the separable Hadwiger number of any smooth strictly convex body in dimensions $d = 2, 3, 4$ is $2d$ and the maximum separable contact number of any packing of n translates of a smooth strictly convex domain is $\lfloor 2n - 2\sqrt{n} \rfloor$. Our proofs employ a characterization of total separability in terms of hemispherical caps on the boundary of a smooth convex body, Auerbach bases of finite dimensional real normed spaces, angle measures in real normed planes, minimal perimeter polyominoes and an approximation of smooth α -symmetric strictly convex domains by, what we call, Auerbach domains. This is joint work with K. Bezdek (Calgary) and M. Oliwa (Calgary).

EVERYONE IS WELCOME!

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