



The Hong Kong Polytechnic University
Department of Applied Mathematics

Colloquium

On

**Quasi-uniformity and low complexity methods
for minimum energy discretizations**

by

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Abstract

The problem of finding configurations of points that are optimally-distributed on a set appears in a number of guises including best-packing problems, coding theory, geometrical modeling, statistical sampling, radial basis approximation and golf-ball design (i.e., where to put the dimples). This talk will focus on classical and recent results concerning geometrical properties of N -point configurations

$\{x_i\}_{i=1}^N$ on a compact metric set A (with metric m) that minimize a weighted Riesz s -energy functional of the form

$$\sum_{i \neq j} \frac{w(x_i, x_j)}{m(x_i, x_j)^s},$$

for a given 'weight' function w on $A \times A$ and a parameter $s > 0$. By a suitable choice of the weight function w , we can generate point configurations on A that have a prescribed limit density as $N \rightarrow \infty$. Furthermore, we establish conditions under which quasi-uniformity holds for a minimizing sequence of configurations and also present a low-complexity method for computing the energy of N points.

Parts of the research are joint with S. Borodachov, D. Hardin and T. Whitehouse.

REFERENCES

- [1] S.V. Borodachov, D.P. Hardin, E.B. Saff, *Asymptotics for discrete weighted Riesz energy problems on rectifiable sets*, Trans. Amer. Math. Soc. 360 (2008), 1559-1580.
- [2] S.V. Borodachov, D.P. Hardin, E.B. Saff, *Low complexity methods for discretizing manifolds via Riesz energy minimizations* (manuscript)
- [3] D. P. Hardin, E. B. Saff, and J. T. Whitehouse, *Quasi-uniformity of Minimal Weighted Energy Points on Compact Metric Spaces*, Journal of Complexity (to appear) arXiv 1104.2911 (2011)

Date : May 8, 2012 (Tuesday)

Time : 4:00 p.m. – 5:00 p.m.

Venue : HJ610, The Hong Kong Polytechnic University

*** * * ALL ARE WIELCOME * * ***