

Department of Mathematics and Statistics
Colloquium Lecture Series

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Notes on Classical and Strict Negative Type

The metric space condition of p -negative type is classical in origin and may be traced back to Arthur Cayley's 1841 work on determinants and geometry. Determining a good positive lower bound on the supremal p -negative type of a given finite metric space often turns out to be a difficult non-linear problem. The problem is important due to its connections with isometric, uniform and coarse embedding theories, as well as for having deep ties to fundamental issues in theoretical computer science such as the recently refuted Goemans-Linial conjecture.

A very closely related notion to classical p -negative type is strict p -negative type. A metric space is said to have strict p -negative type whenever the corresponding non-trivial p -negative type inequalities are all strict. In this talk a new and elementary procedure for determining a lower bound on the supremal (strict) p -negative type of any given finite metric space will be described. These lower bounds are rather good and sometimes even optimal. Moreover, the strategy adopted leads to a notion of enhanced p -negative type and begins to codify a general theory of strict p -negative type for arbitrary metric spaces.

The theory developed in this way leads to non-trivial families of new examples such as: a finite isometric subspace (X, d) of a k -sphere \mathbb{S}^k has maximal p -negative type = 1 if and only if X contains at least two pairs of antipodal points. Other examples – including an in-depth treatment of finite metric trees (the actual stars of this talk) – will be interspersed throughout the presentation.

Thursday, April 16, 2009

Chapman 106

1:00–2:00

Refreshments after the talk in Chapman 101A