

1019-47-157

**J William Helton\***, math dept, UC San Diego, San Diego, CA 92093. *Noncommutative Inequalities.*

The talk concerns inequalities for noncommutative functions. At this point we have for free  $*$ -algebras:

A. versions of the classical real algebraic geometry description of when one polynomial  $p$  is positive on the domain where another polynomial  $q$  is positive (due to Helton McCullough Putinar).

B. classification of convex noncommutative polynomials and rational functions. There are shockingly few of them. (due to Helton McCullough Vinnikov; algorithms for symbolic computation Camino, Helton, Shopple, Sligend).

C. classification of some noncommutative varieties with positive curvature (due to Dym, Helton, McCullough).

D. other.

The talk will select a topic from this. The work originates in trying to develop some theory for studying the matrix inequalities which are ubiquitous in linear engineering systems and control. (Received August 14, 2006)