

Meeting: 1003, Atlanta, Georgia, SS 25A, AMS Special Session on Complex and Functional Analysis, I

1003-47-493 **J. William Helton*** (helton@math.ucsd.edu), Prof. Helton, UC San Diego, La Jolla, CA.
Noncommutative Inequalities. Preliminary report.

The talk concerns inequalities for noncommutative polynomials and rational 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, Shopp, Slind).
- C. some results on noncommutative transformations (due to Helton and Slind).
- 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 September 16, 2004)