School of Mathematical and Statistical Sciences

Colloquium Series

Numerical Investigation of Crouzeix's Conjecture

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Abstract

Crouzeixs conjecture is among the most intriguing developments in matrix theory in recent years. Made in 2004 by Michel Crouzeix, it postulates that, for any polynomial p and any matrix A, $\|p(A)\| \le 2 \max(|p(z)| : z \in W(A))$, where the norm is the 2-norm and W(A) is the field of values (numerical range) of A, that is the set of points attained by $v^* Av$ for some vector v of unit length. Crouzeix proved in 2007 that the inequality above holds if 2 is replaced by 11.08, and very recently this was greatly improved by Palencia, replacing 2 by $1+\sqrt{2}$.
Furthermore, it is known that the conjecture holds in a number of special cases, including n = 2. We use Chebfun to compute the field of values and nonsmooth optimization to investigate the conjecture numerically by attempting to minimize the "Crouzeix ratio, defined as the quotient with numerator the right-hand side and denominator the left-hand side of the conjectured inequality. We present numerical results that strongly support the truth of Crouzeixs conjecture.

This is joint work with Anne Greenbaum.

In addition, Dr. Overton will talk to the students about the opportunities for Ph. D. programs and jobs in mathematics

Date: Monday, November 6, 2017
Time: 12:05pm–1:30pm
Place: EMAGC 1.410

All are welcome! Refreshments will be served at 11:45am.

For further information or for special accommodations, please contact Dr. BaoFeng Feng at 665-2269 or via email at baofeng.feng@utrgv.edu.

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