

TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall

Wednesday, 20 October 2010, 4:00 p.m.
(tea at 3:45)

Fourier Series Methods for Numerical Conformal Mapping of Smooth Domains

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Abstract. We will give an introduction and overview of numerical methods for approximating conformal maps from domains bounded by circles to domains bounded by smooth curves. The methods use FFTs to compute Fourier and Laurent coefficients for the mapping functions. As an introduction, we will discuss Theodorsen's classical method. This method is a linearly convergent method of successive conjugation and is relatively easy to present. Next, we will discuss Fornberg's method for simply connected maps. This method is a Newton-like method for which the inner linear systems are discretizations of the identity plus a compact operator. These linear systems can be solved efficiently with the conjugate gradient method using FFTs for the matrix-vector multiplications. Finally, we will discuss generalizations of Fornberg's method to doubly and multiply connected domains which were developed by the speaker and his students and colleagues.