ICM-9110-17 On the Construction of Szegö Polynomials, C. Jagels and L. Reichel, J. Comput. Appl. Math., 46(1993), pp. 241-254.

ABSTRACT: The Chebyshev and Stieltjes procedures are algorithms for computing recursion coefficients for polynomials that are orthogonal with respect to an inner product defined on (part of) the real axis. The Chebyshev procedure is an implementation of a map from moments to recursion coefficients of orthogonal polynomials. The modified Chebyshev procedure is an implementation of a map from modified moments to recursion coefficients. The latter map is generally much better conditioned than the former one. The conditioning of these maps has been studied by Gautschi. This paper is concerned with analogues of the Chebyshev and Stieltjes procedures when the inner product is defined on the unit circle. Polynomials orthogonal with respect to such an inner product are known as Szegö polynomials, and the analogue of the Chebyshev procedure is known as Schur's algorithm. This algorithm implements a map from moments to recursion coefficients for Szegö polynomials. Our analysis shows that this map generally is much better conditioned than the map implemented by the Chebyshev procedure, and suggests that Schur's algorithm is as insensitive to errors in the data as the modified Chebyshev procedure. Thus, roughly, moments associated with inner products defined on the unit circle correspond to modified moments associated with inner products defined on the real axis.