

**ICM-9111-20** DOWNDATING OF SZEGÖ POLYNOMIALS AND DATA FITTING APPLICATIONS, G.S. AMMAR, W.B. GRAGG AND L. REICHEL, *Linear Algebra Appl.*, 172(1992), pp. 315-336.

**ABSTRACT:** Many algorithms for polynomial least squares approximation of real-valued function on a real interval determine polynomials that are orthogonal with respect to a suitable inner product defined on this interval. Analogously, it is convenient to compute Szegő polynomials, i.e., polynomials that are orthogonal with respect to an inner product on the unit circle, when approximating a complex-valued function on the unit circle in the least squares sense. It may also be appropriate to determine Szegő polynomials in algorithms for least squares approximation of real-valued periodic functions by trigonometric polynomials. This paper is concerned with Szegő polynomials that are defined by a discrete inner product on the unit circle. We present a scheme for downdating the Szegő polynomials and given least squares approximant when a node is deleted from the inner product. Our scheme uses the QR algorithm for unitary upper Hessenberg matrices. We describe a data-fitting application that illustrates how our scheme can be combined with the fast Fourier transform algorithm when the given nodes are not equidistant. Application to sliding windows is discussed also.