

Meeting: 1001, Evanston, Illinois, SS 22A, Special Session on Special Functions, Orthogonal Polynomials, and their Applications

1001-41-72 **Gilbert G. Walter*** (ggw@uwm.edu), Dept. of Math Sciences, UWM, box 413, Milwaukee, WI 53201, and **Tatiana Soleski**. *A new method of calculating values of prolate spheroidal wave functions.*

Prolate spheroidal wave functions, because of their many remarkable properties leading to new applications, have recently experienced an upsurge of interest. They may be defined as eigenfunctions of either a differential operator or an integral operator (as observed by Slepian in the 1960's). There are various ways of calculating their values based on both approaches. The standard one uses an approximation based on Legendre polynomials, which, however, is valid only on a finite interval. An alternative, valid in a neighborhood of infinity, uses a Bessel function approximation. In this paper we present a new method based on an eigenvalue problem for a matrix operator equivalent to that of the integral operator. Its solution gives the values of these functions on the entire real line and is computationally more efficient. (Received August 09, 2004)