1030-41-117   **Gilbert G Walter*** (`ggw@uwm.edu`), Dept.of Mathematical Sciences, UWM, Box 413, Milwaukee, WI 53211. *Chromatic series of prolate spheroidal waves and wavelets.*

Neither the Shannon sampling theorem nor Taylor's theorem works very well for realistic approximations to bandlimited signals. The former requires data on all integers in increasing intervals, while the latter requires estimation of an increasing number of derivatives at a point. A way around this, devised by Ignjatovic, led to the theory of *chromatic derivatives* and *chromatic series* in which the derivative operator of Taylor's theorem is replaced by a differential operator based on orthogonal polynomials. In this work the theory is extended to include other series as well. In particular, the orthogonal polynomial series are replaced by series of prolate spheroidal wave functions which can be accurately approximated by polynomials of low degree. This, in common with Taylor's theorem, is a local result but gives a global approximation. By using, in addition, prolate spheroidal wavelet series, we get a generalization of Shannon's theorem. Then, by combining the two, we obtain an overdetermined system which can use either local or global data to approximate the original function. (Received July 26, 2007)