

**Meeting:** 1003, Atlanta, Georgia, SS 31A, AMS-SIAM Special Session on Integrable Systems and Special Functions, I

1003-33-136      **Xiaoping Shen\*** ([shen@math.ohiou.edu](mailto:shen@math.ohiou.edu)), Department of Mathematics, Ohio University, Athens, OH 45701, and **Naoki Saito** ([saito@math.ucdavis.edu](mailto:saito@math.ucdavis.edu)), Department of Mathematics, University of California - Davis, Davis, CA 95616. *On Slepian series expansion.*

Prolate spheroidal wave functions (Slepian functions) are special functions that are most localized in both spatial and frequency domain, simultaneously. They lead to the optimal solution of the concentration problem once posed by Claude E. Shannon. This fact was unraveled by David Slepian and his collaborators at Bell Lab in 1960s. Since then this system has shown promise for many applications in engineering and some other areas. Unlike usual orthogonal polynomial or trigonometric systems, Slepian functions possess peculiar properties, such as, dual orthogonality, duality of time-frequency representation, and multiscale structure, to name a few. This talk is devoted to the study of the orthogonal expansion using Slepian functions in Paley-Wiener space and beyond. We shall give the convergence and error analysis of the expansion coefficients and illustrate the theoretical results by some numerical examples. We conclude the talk by discussing problems raised in such expansions used in the practice when data contaminated with noise. (Received August 10, 2004)