1067-42-1200 **Frank Filbir**, **Hrushikesh N. Mhaskar** and **Jürgen Prestin***
(prestin@math.uni-luebeck.de), Institute of Mathematics, University of Lübeck, Wallstr. 40, D-23560 Lübeck, Germany. *On the problem of parameter estimation in exponential sums.*

Given finitely many samples of the sum of exponentials

$$x(k) = \sum_{j=-I}^{I} a_j \exp(-\mathrm{i}\omega_j k) + \epsilon(k), \qquad k = -2N, \cdots, 2N,$$

where $\epsilon(k)$ are random variables with mean zero, each in the range $[-\epsilon, \epsilon]$ for some $\epsilon > 0$, we determine approximately the frequencies ω_j. We combine the features of several recent works to use the available information to construct the moments of a positive measure on the unit circle. In the absence of noise, the support of this measure is exactly $\{\exp(-\mathrm{i}\omega_j) : a_j \neq 0\}$. This support can be recovered as the zeros of the monic orthogonal polynomial of an appropriate degree on the unit circle with respect to this measure. In the presence of noise, this orthogonal polynomial structure allows us to provide error bounds in terms of ϵ and N. Together with an appropriate algorithm to construct orthogonal polynomials given the moments, our construction of the moments yields a stable and efficient algorithm to compute the frequencies. (Received September 20, 2010)