William B. Jones and Walter M. Reid*, Walter M. Reid, Department of Mathematics, UW-Eau Claire, Eau Claire, WI 54702-4004. Distribution Analysis Using PPC-Continued Fractions.

This presentation deals with the Distribution Analysis Problem (DAP) which consists of finding an unknown distribution $\psi$ on $[-\pi, \pi]$ using sequences of real numbers $X_N(m), m = 0, 1, 2, ..., N - 1, N = 2I + 1, I \in \mathbb{N}$, obtained from superpositions of sinusoidal waves determined by $\psi$. The method described here, called the $Nm$-process, is similar to the $N$-process which has been used in earlier work in connection with the frequency analysis problem (FAP). Both methods employ the even approximants $R_{2m}(\psi_N, z)$ of positive Perron-Caratheodory (PPC) continued fractions, where $\psi_N$ is a distribution function on $[-\pi, \pi]$ determined by the $X_N(m)$ data. For the $Nm$-process it is shown that, with certain restrictions imposed on $\psi$, $R_{2m}(\psi_N, z) \to H(\psi, z)$ as $N \to \infty$ and $m \to \infty$, where $H(\psi, z)$ is the Herglotz transform of $\psi$. While these results are restricted to distribution functions $\psi$ such that $\psi'(\theta)$ exists and is a bounded even function on $[-\pi, \pi]$, the long term goal is the treatment of general distribution functions $\psi$. (Received September 26, 2005)