1086-12-2170 **Matthew T Comer*** (mcomer@ncsu.edu), **Erich L Kaltofen** (kaltofen@math.ncsu.edu) and **Clément Pernet** (clement.pernet@imag.fr). *Sparse Polynomial Interpolation with Errors: Power and Shifted Bases.*

We discuss algorithms to solve two problems of sparse polynomial interpolation with errors. In the first problem, we recover a $t$-sparse polynomial $f(x)$ (in the power basis) from values $f(\omega^i)$, $i = 1, \ldots, N$, where $\omega$ is a field element of our choice, and $e$ values contain random/misleading errors. Our algorithm requires bounds $T \geq t$ and $E \geq e$, and $N = 2T(2E + 1)$; it is based on the interpolation algorithm of Prony (reformulated by Ben-Or and Tiwari).

In the second problem, we compute a shift $s$ that will yield the sparsest representation of a polynomial $f(x)$ in the shifted power basis $(x - s)^k$, but from polynomials $f(\omega^i + z) \in \mathbb{F}[z]$. Here, the polynomials are interpolated densely, using Reed-Solomon error-correction, then the shift $s$ and sparsity $t$ are computed from the error-free "values" $f(\omega^i + z)$, where now $i = 1, \ldots, 2T + 1$. The second step employs the results of Giesbrecht, Kaltofen, and Lee.

Both algorithms assume a black box for $f(x)$ that returns finitely many faulty values. In low dimension with few variables, multivariate sparse polynomials are handled by Kronecker substitution. With many variables, Zippel's algorithm applies, but needs significantly more evaluation points. (Received September 25, 2012)