1086-VO-1134 **Neranga Fernando*** (wfernand@mail.usf.edu), Department of Mathematics and Statistics, University of South Florida, Tampa, FL, **Xiang-dong Hou**, Department of Mathematics and Statistics, University of South Florida, and **Stephen Lappano**, Department of Mathematics and Statistics, University of South Florida. *New classes of permutation polynomials over finite fields defined by functional equations.* Preliminary report.

Let p be a prime and $q = p^k$. The polynomial $g_{n,q} \in \mathbb{F}_p[x]$ defined by the functional equation

$$\sum_{a \in \mathbb{F}_q} (x+a)^n = g_{n,q}(x^q - x)$$

gives rise to many permutation polynomials over finite fields. We are interested in triples $(n, e; q)$ for which $g_{n,q}$ is a permutation polynomial of $\mathbb{F}_{q^e}$.We survey recent discoveries of permutation polynomilas in form of $g_{n,q}$. In particular, we find that when $n = q^{p+i+1} - q^{2i+1} - 1$, and

$$\left(\frac{2i+1}{q}\right) = \begin{cases} 1 & \text{if } i \text{ is odd,} \\ (-1)^{\frac{q-1}{2}} & \text{if } i \text{ is even,} \end{cases}$$

where $\left(\frac{2i+1}{q}\right)$ is the Jacobi symbol, then $g_{n,q}$ is a permutation polynomial of $\mathbb{F}_{q^2}$. (Received September 19, 2012)