1077-11-1516 **Lois Simon*** (simon.lois@gmail.com). *Character sums and hyperelliptic curves associated with subsets of finite fields with square order.*

In this work we will work in finite fields $\mathbb{F}_{q^2}$ where$q = p^n$for some prime$p$. We will work with hyperelliptic curves denoted$Y_S\colon y^2 = f_S(x = \prod_{s\in S}(x-s)$where$S \subset \mathbb{F}_{q^2}$;$X_S$represents the non-singular projective model ofY_S. We utilize the Hasse-Weil bound $|X_S(\mathbb{F}_{q^2}) - (q^2+1)| \leq 2gq$ and$\Lambda(S) = \sum_{b\in\mathbb{F}_{q^2}} \chi(f_S(b)) = |Q_S| - |Q'_S|$, as we try to determine when X_S is maximal, minimal and/or optimal. We say X_S is maximal if the upper Hasse-Weil bound is achieved and if

$$|X_S(\mathbb{F}_{q^2})| = \begin{cases} 1+q^2+q(|S|-1) & \text{if } |S| \text{ is odd,} \\ 1+q^2+q(|S|-2) & \text{if } |S| \text{is even.} \end{cases}$$

We say X_S is minimal if the lower Hasse-Weil bound is reached and if

$$|X_S(\mathbb{F}_{q^2})| = \begin{cases} 1+q^2-q(|S|-1) & \text{if } |S| \text{ is odd,} \\ 1+q^2-q(|S|-2) & \text{if } |S| \text{ is even.} \end{cases}$$

Finally we say X_S is optimal if $\Lambda(S) = q^2 - |S|$. There is an overlap of maximal curves and minimal curves; there is also an overlap between maximal curves and optimal curves. In particular maximal sets, S,and their associated maximal curves X_S are useful in coding theory. (Received September 20, 2011)