# Strongly regular graphs arising from non weakly regular ternary bent funtions

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**Abstract**

In [3], Tan, Pott and Feng proved that a ternary bent function $f : \mathbb{F}_{3^{2m}} \to \mathbb{F}_3$ such that $f(x) = f(-x)$ is weakly regular if and only if the two subsets $D_1$ and $D_2$ (see [3]) of $\mathbb{F}_{3^{2m}}$ are partial difference sets with certain parameters.

In [1], Çesmelioğlu, Meidl and Pott stated that for an odd prime $p$, "the existence of a non weakly regular bent function $f : \mathbb{F}_{p^n} \to \mathbb{F}_n$ with the dual $f^*$ is weakly regular" is an open problem. In [2], among other things, we solved this open problem by using two subsets $B^+(f)$ and $B^-(f)$ of $\mathbb{F}_{p^n}$. These subsets $B^+(f)$ and $B^-(f)$ were defined in [2].

In this work we obtain analogous results of [3] for non weakly regular bent functions using the subsets $B^+(f)$ and $B^-(f)$ of [2]. In particular we show that, if $f : \mathbb{F}_{3^{2m}} \to \mathbb{F}_3$ is a non weakly regular bent function such that $f(x) = f(-x)$, then the subsets $B^+(f)$ and $B^-(f)$ are regular partial difference sets with certain parameters. Moreover, if dual $f^*$ of $f$ is not bent, then those partial difference sets are non-trival regular partial difference sets corresponding to non trivial strongly regular graphs.

**Keywords**: Bent functions, non weakly regular bent functions, partial difference sets, strongly regular graphs.

## References

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