1056-05-1921 **Adegoke S Osifodunrin*** (asa_osifodunrin@yahoo.com), Department of Mathematical Sciences, Georgia Southern University, P.O. Box 8093, Statesboro, GA 30460, and **Ken. W Smith** (kenwsmith@shsu.edu), Sam Houston State University, Dept. of Mathematics and Statistics, P. O. Box 2206, Huntsville, TX 77341-2206. *On the Non-existence of* $(160, 54, 18)$ *Difference Sets.*

Much has been written in recent years, investigating the existence of the (160, 54, 18) parameter set. This parameter set belongs to the family of difference sets with parameters $(p^s\frac{(r^{2m}-1)}{r-1}, p^{s-1}r^{2m-1}, p^{s-2}(r-1)r^{2m-2})$, where p is a prime, $r=\frac{p^s-1}{p-1}$, $s\geq 2$ and $m\geq 1$, when $p=s=m=2$. The search for difference sets with these parameters was motivated by the discovery of the first design with these parameters in 1993 by Spence et al.. Lander (1983), Kipilovich (1989) and Ma et al.(1999) ruled out the existence of difference sets in all (seven) abelian groups of order 160, while Pollatsek et al.(2003) showed that any group of order 160 with homomorphic image $D_{10}\times C_2$ or $(C_2)^5$ or abelian homomorphic image of exponent 2, 4, 5 or 10 with order greater than 20 does not admit (160, 54, 18) difference sets. In this paper, we explore groups of order 160, G, by considering the images of hypothetical difference sets in some factor groups G/N, where N is a suitable normal subgroup. Thus, if (160, 54, 18) difference sets exist, it must be in the group $G=((C_2)^4\rtimes C_5)\rtimes C_2$, with GAP location number [160, 234]. (Received September 22, 2009)