SMITH SET FOR A FINITE PERFECT GROUP

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Abstract. Let G be a finite group. Two G-modules U and V are called Smith equivalent if there is a smooth action on a sphere with just two fixed points x and y such that U (resp. V) is equivalent to the tangential G-module over x (resp. y). A Smith set $Sm(G)$ is a subset of the real representation ring $RO(G)$ consisting of all $U - V$ such that U and V are Smith equivalent G-modules.

Now we let G be a finite perfect group. It is completely known a perfect group G so that $Sm(G)$ is not trivial. Let $\mathcal{P}(G)$ be the set of subgroups of G of prime power order and $\mathcal{P}_{odd}(G)$ the set of subgroups of odd prime power order. Further let $RO(G)^{\{G\}}$ be the subgroup of $RO(G)$ consisting of $U - V$ with $\dim(U) = \dim(V)$. For a set $\mathcal{F}$ of subgroups of G, we denote by $RO(G)^{\{G\}}_{\mathcal{F}}$ the subgroup of $RO(G)^{\{G\}}$ consisting of $U-V$ such that U and V are isomorphic as a P-module for any $P \in \mathcal{F}$. Then $RO(G)^{\mathcal{L}(G)}_{\mathcal{P}(G)} \subset Sm(G) \subset RO(G)^{\{G\}}_{\mathcal{P}_{odd}(G)}$. Further if a finite perfect group G has no element of order 8 then $Sm(G) = RO(G)^{\{G\}}_{\mathcal{P}(G)}$. In this talk we treat finite perfect groups G of small order and discuss whether $Sm(G) = RO(G)^{\{G\}}_{\mathcal{P}(G)}$.

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