Realization of closed manifolds as $A_5$-fixed point sets

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**Abstract.** Let $G$ be the alternating group on 5 letters and let $\mathfrak{M}$ denote the family of closed smooth manifolds which can be obtained as the $G$-fixed point sets of smooth $G$-actions on disks. Let $S^n$ denote the sphere of dimension $n$, let $P^n_{\mathbb{C}}$ and $P^n_{\mathbb{R}}$ denote the complex and real projective space of dimension $n$, respectively, and let $L^{2n-1}_m$ denote the lens space $S(\mathbb{C}^n)/C_m$, where $m$ is an integer $\geq 3$ and

$$C_m = \{z \in \mathbb{C} \mid z^m = 1\}.$$

Let $M \in \mathfrak{M}$. We will discuss whether $M$ can be realized as the $G$-fixed point sets of smooth $G$-actions on $S^n$, $P^n_{\mathbb{C}}$, $P^n_{\mathbb{R}}$ and $L^{2n-1}_m$.