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Euclidean Symmetry of Closed Surfaces Immersed in 3-Space

(Joint work with Thomas W. Tucker.) Given a finite group $G$ of orientation-preserving Euclidean isometries and a closed surface $S$, an immersion $f : S \to \mathbb{E}^3$ is in $G$-general position if $f(S)$ is invariant under $G$, points of $S$ have disk neighborhoods whose images are in general position, and no singular points of $f(S)$ lie on an axis of rotation of $G$. For such an immersion, there is an induced action of $G$ on $S$ whose Riemann-Hurwitz equation satisfies certain natural restrictions. Riemann-Hurwitz equations fulfilling these restrictions are realized by a $G$-general position immersion of $S$ in most cases. Exceptions arise, in particular, for low genus and few branch points. In this talk, we review these results and consider the more general case of $G$ containing orientation-reversing Euclidean isometries.