The Primitive Distance-Transitive Representations of the Fischer Groups

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Abstract

We classify the primitive distance-transitive representations of the Fischer sporadic simple groups and their automorphism groups. It turns out that the only primitive distance-transitive representations of these groups are their rank 3 representations. In the process of our work, we also classify and study the primitive multiplicity-free permutation representations of these Fischer groups. Our methods, which we describe in some detail, demonstrate the use of computational and randomized techniques in the classification of distance-transitive graphs and the study of very large permutation representations.