

**The algebraic and geometric classification of symmetries of the complex matrix algebras**

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ABSTRACT. We study symmetries (self-adjoint unitaries) of the complex matrix algebras. Especially, we consider the cases of matrix size two by two and three by three, to algebraically classify all symmetries (Hermitian unitaries) in these cases, to determine the geometric structure of the spaces of the partially degenerate, or non-degenerate (in our sense) symmetries.