

Title:

New Hidden Symmetries in Equivariant Dynamical Systems

Abstract:

We investigate matrices $A \in \mathbb{R}^{n,n}$ with respect to their equivariance properties: It is well known that the equivariance of A with respect to certain groups $\Sigma \subset \mathbf{O}(n)$ generically leads to the existence of multiple eigenvalues. We show that in this case A is (additionally) equivariant with respect to the action of a group $\Gamma(A) \simeq \prod_{i=1}^k \mathbf{O}(m_i)$ where m_1, \dots, m_k are the multiplicities of the eigenvalues $\lambda_1, \dots, \lambda_k$ of A – even if Σ is finite. Moreover, $\Gamma(A)$ consists of all the matrices which commute with A , so that in particular $\Sigma \subset \Gamma(A)$. We discuss implications of this result for equivariant nonlinear dynamical systems. This way we are able to explain the existence of solutions of certain types which is induced by the action of "hidden symmetries" in $\Gamma(A) \setminus \Sigma$. This is joint work with Raphael Gerlach (Paderborn University) and Sören von der Gracht (Paderborn University).