What can algebraic invariants tell us about robot kinematics

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Abstract: The kinematics of mechanisms and robots are represented mathematically by maps in the Euclidean group $SE(n)$ where, practically, $n = 2$ or 3. Information about such devices is frequently captured by the associated Lie algebras, which in the spatial case $n = 3$ is the 6-dimensional space of twists. Fundamental properties of twists, multi-twists, and twist subspaces (or screw systems) are captured by their polynomial invariants. We explore these invariants and how they relate to the geometry of robot mechanisms.