Singular configurations of mechanisms and manipulators

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In singular configurations, the properties and behaviour of mechanisms can undergo sudden and dramatic changes. Hence the enormous practical value of singularity analysis for the design and use of robotic manipulators. The theoretical importance of the topic stems from the critical role singularity plays in algebraic geometry and in the theory of differentiable mappings. The study of singularities has been a major topic in the robotics literature. Yet, even among specialists in robot kinetostatics, there is slight knowledge and often misunderstanding about what singularities are in general and what their effects can be. The talk will try to provide a simple but rigorous introduction. Particular attention will be given to lesser known types of singularity, exhibited by some parallel robots and other mechanisms with closed-loop kinematic chains.