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Titel des Beitrags: Spline deformation of locally optimal trajectories: Feasibility and upper bound on control inputs

Abstract: Deformation of optimal trajectories has a great potential in various applications due to the ability of realtime recomputation of the overall trajectory when applying new boundary conditions. This paper presents a novel approach where optimal trajectories are created offline through numerical direct optimal control methods. Afterwards the trajectories are deformed online with a spline deformation approach, providing minimum acceleration deviation between optimal and deformed trajectories and considerably reducing the computational complexity of the algorithm during run time. A feasibility check based on upper bounds for the deformed trajectory, the controller tracking error and the resulting torque is provided. This guarantees correct task execution in the presence of bounded disturbances and unmodeled dynamics.

Stichworte: computational complexity; manipulators; numerical control; optimal control; splines (mathematics); boundary conditions; bounded disturbances; computational complexity; control inputs; controller tracking error; locally optimal trajectories spline deformation; manipulator;