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Potential Field Functions for Motion Planning and Posture of the Standard 3-Trailer System

Authors : K. Raghuwaiya, S. Singh, B. Sharma, J. Vanualailai

Abstract : This paper presents a set of artificial potential field functions that improves upon; in general, the motion planning and posture control, with theoretically guaranteed point and posture stabilities, convergence and collision avoidance properties of 3-trailer systems in a priori known environment. We basically design and inject two new concepts; ghost walls and the Distance Optimization Technique (DOT) to strengthen point and posture stabilities, in the sense of Lyapunov, of our dynamical model. This new combination of techniques emerges as a convenient mechanism for obtaining feasible orientations at the target positions with an overall reduction in the complexity of the navigation laws. The effectiveness of the proposed control laws were demonstrated via simulations of two traffic scenarios.

Keywords : artificial potential fields, 3-trailer systems, motion planning, posture, parking and collision, free trajectories
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