

Advanced Predictive Guidance Navigation for Mobile Robots: A Novel Strategy for Rendezvous in Dynamic Settings

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Abstract—This paper presents a novel on-line trajectory planning method for the autonomous robotic interception of moving targets in the presence of dynamic obstacles, i.e., position and velocity matching (also referred to as *rendezvous*). The novelty of the proposed time-optimal interception method is that it directly considers the dynamics of the obstacles as well as the target in its interception maneuver: the velocities and accelerations of the obstacles and the target are predicted in real-time for potential collisions. The method is designed to deal with highly-maneuvering obstacles and targets. The interception maneuver is computed using an Advanced Predictive Guidance Law.

Extensive simulation and experimental analyses, some of which are reported in this paper, have clearly demonstrated the time efficiency of the proposed rendezvous method.

Index Terms— Target interception, on-line trajectory planning, rendezvous guidance.