# Research Project: Optimal Low-Thrust Collision Avoidance

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**This work proposes two different optimal guidance laws for the problem of low-thrust collision avoidance. The dynamics are described by the Clohessy-Wiltshire equations, as the nominal orbit of the maneuvering object is circular. Unlike previous solutions, only the position of the passive object relative to the nominal orbit at the conjunction is used, such that the eccentricity of the passive object's orbit is arbitrary. The first algorithm is partially analytical, and maximizes the weighted miss distance with a bounded thrust, using optimal control. The second algorithm is fully analytical, and minimizes the propellant consumption for a desired miss distance, using optimal control theory. Unlike previous solutions, both the miss distance and the fuel are considered by the cost function, which allows for a better analysis. Simulation results show that both guidance laws are mostly tangential. Compering the two proposed guidance laws, it is shown that for the same miss distance and maximum thrust, the minimum propellant law saves a significant amount of propellant, compensating for a slightly longer maneuver.**

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