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LANDING GUIDANCE METHOD FOR REUSABLE LAUNCH VEHICLE BASED ON CONVEX OPTIMIZATION

Abstract

Online autonomous fight trajectory planning according to real-time mission requirements is a key problem to be solved for reusable launch vehicle fixed-point landing missions. Complex constraints such as control constraints, path constraints and fixed-point constraints need to be satisfied during the landing process, and the planning algorithm is required to be efficient and optimal. Aiming at the problem, this paper designs a flight path planning and guidance algorithm based on the convex optimization method. A mathematical model of a reusable launch vehicle landing mission is first established, and then the model is transformed with the lossless convexification method. Then a discrete computing model that could be applied in engineering is given. Finally, it is verified by flight tests, and the results show that the method can meet the real-time online computing requirements and achieve high-precision fixed-point landing while minimizing mission fuel consumption. Key Words: reusable launch vehicle; Online trajectory planning; Convex optimization; Flight test verification