Impulsive Reconfiguration in Formation Flying

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In this research, we look for fuel-optimal reconfiguration trajectories using impulsive control. Reconfiguration is classified into three parts in this work, which are respectively initialization, reconfiguration in a narrow sense, and reassignment. We obtain reconfiguration trajectories in the four-satellite formation. The reference orbit of chief satellite is considered as two-body circular orbit. Hence, Hill's equation is used in this study. Here, the state transition matrix is used instead of numerical integration. Genetic algorithm as a global optimization tool is used to find sub-optimized two impulsive trajectories. Primer vector theory as a local optimization technique is applied to fully optimized solutions and to obtain multi impulsive trajectories. The results show that fuel saving through multi impulsive trajectory can be offered, however its amount is insignificant. Two impulsive trajectories obtained by genetic algorithm, therefore, are credible and can be practically used.