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### Title
## Variable-Performance Electrospray Maneuvers Optimization

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### Abstract
Electric propulsion is establishing itself as an advantageous alternative to chemical propulsion for space mobility, due to the propellant savings deriving from the high exhaust velocities attainable. Among the various existing technologies, a growing interest is building up around electrosprays because of their competitive performance in the low power range, where Hall thrusters or gridded ion engines suffer from efficiency loss and become unappealing. Among other qualities, such as high efficiency, the use of liquid propellants, and nearly instantaneous operations, externally wetted electrospray can operate in different regimes depending on the difference of potential set-point [1]. The ionic and droplet regime, which are characterized respectively by high specific impulse and high thrust-to-power ratio, could be combined by switching dynamically between them throughout the maneuver, improving the exploitation of the performance of the thruster. In principle, this enables trading thrust for specific impulse when most energetically convenient, and vice-versa. Additionally, the high thrust-to-power ratio mode could be exploited for collision avoidance maneuvers, improving the responsiveness of the satellite. This work presents the application of a methodology for optimizing variable-performance electrospray maneuvers [2], focusing on small satellites in LEO. The methodology relates the set-point selection of the thruster to a function describing the thrust effectivity [3] along the orbit. The parameters of the function are selected by a multi-objective genetic algorithm, using propellant and duration of a given maneuver as objectives to minimize. Some numerical examples are presented, showing that a variable-performance maneuver allows for discovering solutions of compromise between the two regimes of an electrospray propulsion system, and enables a broader exploration of the mission design space.

### References
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