SKY SAILING OF UNTETHERED AEROSTATS FOR EFFICIENT AERIAL MONITORING

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This paper explores the novel concept of Sky Sailing as an innovative method for energy-efficient aerial monitoring using untethered aerostats. By leveraging novel aerostat construction [1,2], controlled aerodynamic sails and auxiliary propulsion, the system enables precise navigation with minimal power consumption [3,4,5]. Adjusting the sails angles of attack and employing lateral engines ensure high aerostat maneuverability and stability, even in challenging wind conditions. Operating at a wide range of altitudes, the system can provide high-resolution observation data, surpassing satellite-based monitoring in accuracy and cost-effectiveness. Presented modelling approach combining analytical methods and finite volume-based simulations is effectively used to describe the aerostat's motion dynamics. Furthermore, a control strategy is developed to optimize trajectory tracking or travel between several checkpoints while minimizing energy use. The discussed potential applications of the system include environmental monitoring, meteorology and agricultural surveillance.

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