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MOST RECENT ADVANCES IN HALE AIR VEHICLES

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ABSTRACT

The development of high-altitude long-endurance (HALE) air vehicles, usually operating at altitudes in the range 15 to 25 km, has been an interesting research topic for both scientists and engineers for the past few decades for their various possible purposes: atmospheric measurements, surveillance, communication. On the other hand, design limitations that hinder wider applicability include rarified atmosphere, higher required lift coefficients when cruising, lower Reynolds numbers, strength and weigh constraints, autonomous operation, etc. However, due to numerous technological breakthroughs in the past couple of years (such as solar-electric propulsion, hydrogen fuel cells, AI-driven control systems, improved sensors and actuators, innovative materials and structures), in addition to the possibility to act as near-Earth satellites, they are becoming increasingly popular.

The lecture/talk aims to introduce some of the existing state-of-the-art HALE aircraft together with their missions, requirements and basic characteristics. It accentuates the most recent technological advances and points to some future development trends. It also provides an overview of the work that has so far been performed at the Department of Aerospace Engineering at the University of Belgrade, Faculty of Mechanical Engineering that includes preliminary aerodynamic analysis and airfoil optimization, structural dimensioning of the wing as well as mission planning for a HALE platform. The current results provide a foundation for future research, with the long-term objective to enable the development of a HALE air vehicle in Serbia.