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小型和微型无人机的气动特点和设计

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Aerodynamic Characteristics of Small/Micro Unmanned Aerial Vehicles and Their Shape Design

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摘要

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摘要 讨论了当前包括固定翼、扑翼和微型旋翼的小型无人驾驶飞行器(SUAV)和微型无人驾驶飞行器(MAV)的进展和未来发展可能涉及的技术问题。讨论了低雷诺数空气动力特性,包括分离气泡和展弦比的影响。介绍了用于拍动翼的非定常空气动力特性和高升力机理。讨论了目前存在的2种设计方法——多学科/多目标优化设计和探索式/进化式的设计方法,以及在设计中柔性翼和主动智能控制的重要性。

关键词: 小型/微型无人驾驶飞行器 空气动力学 外形设计

Abstract: The current development of small/micro unmanned aerial vehicles represented by the platforms of fixed wing, flapping wing and rotor wing, *etc.*, is discussed. The related techniques for their further development are mentioned too. The aerodynamic characteristics of low Reynolds number, the influence of separation bubble and aspect ratio are discussed. The unsteady aerodynamics and the unsteady high-lift mechanisms applied in flapping wings are introduced. Two available design methods, multidisciplinary/multiobjective optimization method and heuristic/evolutionary method, and the importance in design of flexible wing and active intelligent control are discussed.

Keywords: small/micro unmanned aerial vehicle aerodynamics shape design

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