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Linear model identification of beetle-mimicking flapping wing micro-air vehicle in hovering flight (Conference Paper)

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Abstract

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This paper presents a linear time invariant model identification for beetle mimicking flapping wing micro air vehicle (FWMAV) in hovering mode. The identification is facilitated by assuming the wings of the beetle rectangular in shape and the body is considered cylindrical. The main thrust is provided by flapping the wings of the FWMAV whereas the trailing-edges-change mechanism was kept off. The measurable aerodynamic forces and moment's measured data are utilized in the states' reconstruction. The state reconstruction was carried out via the discrete time integration of linear and angular acceleration. Having reconstructed the states, the standard least mean square estimation (LMSE) based estimation approach is used to estimate the system's stability and control derivatives. The results of the estimation are validated with the experimental data, and show the success of the estimation approach. © 2016 IEEE.

Author keywords

Beetle Mimicking Flapping Wing Micro Air vehicles | Hovering Flight | Linear Time Invariant Dynamic Model | System Identification

Indexed keywords

Engineering controlled terms: Computational fluid dynamics | Flight control systems | Identification (control systems) | Intelligent control | Intelligent robots | Robotics | Smart sensors | Wings

Engineering uncontrolled terms: Angular acceleration | Estimation approaches | Flapping wing micro air vehicle | Hovering flights | Linear time invariant | Linear time invariant model | State reconstruction | System's stabilities

Engineering main heading: Micro air vehicle (MAV)

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