

Performances Improvement of a Motor Speed Controller for Low-Cost MAVs

Many cheap actuation solutions are available nowadays for the design of small aerial vehicles. However, these solutions generally have low performance and are provided with poor documentation. In order to reach the expected requirements, there is a strong desire to improve the performance of these systems. In this paper, the behavior of a brushless electric motor and its low-cost controller is studied. The specific case of the propelling system of a coaxial helicopter is considered here, but the methodology can be applied to any brushless electric motor use. Firstly an identification procedure is designed in order to obtain an open-loop model of the system. Then, using structured H_∞ synthesis, a robust low-order speed controller is developed, so that it can be implemented on a microcontroller with low processing power. The program obtained can be used as an alternative firmware on existing low-cost control boards. Finally, experimental results are presented.