Robust gust load alleviation for flexible aircraft

Paolo Massioni*†[1], Hugo Fournier[1], Minh Tu Pham[2], Laurent Bako[1], Michele Colombo[1], and Robin Vernay[1]

[1]Ampère, Département Automatique pour l'Ingénierie des Systèmes (AIS) – INSA Lyon, France – France

[2]Institut National des Sciences Appliquées de Lyon – Institut National des Sciences Appliquées, Université de Lyon – France

Résumé

This work studies the gust load alleviation of a flexible aircraft equipped with a lidar sensor that measures the wind velocity ahead of the aircraft. The focus is put on the aeroelastic dynamics uncertainties due to the evolution of the velocity and the altitude during a flight, and to the variations of the aircraft mass configuration. A robust control approach is adopted in order to minimize the aircraft loads due to the wind in presence of such uncertainties with low-order controllers that satisfy the constraints imposed by the system's limitations and the implementability considerations. This is achieved through structured mixed H2/H-inf synthesis with multiple models. The load alleviation capability of controllers of various orders, using a variable number of control surfaces, is assessed through the computation of the maximum loads obtained in various conditions of velocity, altitude and mass configurations.

*Intervenant

†Auteur correspondant: