

## **Control design for a coupled fluid-structure system with piezoelectric actuators**

Structural vibrations are a major concern for several aerospace applications. In the case of airplanes, vibrations can lead to material fatigue, aeroelastic instability and reduced maneuverability. The motion of fuel in large tanks inside the wing can increase these problems. This work is intended to design a control law, in order to reduce vibrations of a fluid-structure coupled system. Piezoelectric patches are used as actuators. A fixed-structure H infinity synthesis method is used. The goal is to design a robust controller which attenuates the vibrations whatever the filling of fluid in the tank. Three different strategies were tested: a control designed to the nominal plant; multi-model design, considering several operating points of the plant; iterative robust multi-model design, taking an uncertain model into account. Simulation results are promising: the two last designs were able to considerably increase damping for different filling ratios of the tank.