

MEED Seminar

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Design of a numerical model for the simulation of bird flight

November 8, 2019 – 13:00

Building Stevin, Room b.(-145) - MEED



Design of a numerical model for the simulation of bird flight

Although engineers have been inspired by it for decades, the mechanisms of bird flight are still poorly understood. Existing research analyses the flight to find the key to its performances but it remains elusive. In this presentation, a numerical model for the simulation of bird flight is presented. Such a model can lead to a better understanding of bird flight by its synthesis.

The bio-inspired model combines a multi-body model of a bird's skeleton with a plumage model to represent the wing. It is coupled with an aerodynamic solver using immersed lifting lines, where all the aerodynamic properties of the wing are contained in a single line.

A sensitivity analysis is carried out for the design of a flight controller. Specifically, the influence of shoulder kinematics features on the aerodynamic forces and moments are evaluated. A controller is then designed to reach stable level flight.

The resulting multi-physics tool captures at a high fidelity the flight dynamics, required efforts and resulting wake, simulating stable flight for a bird and its response to simple commands.

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