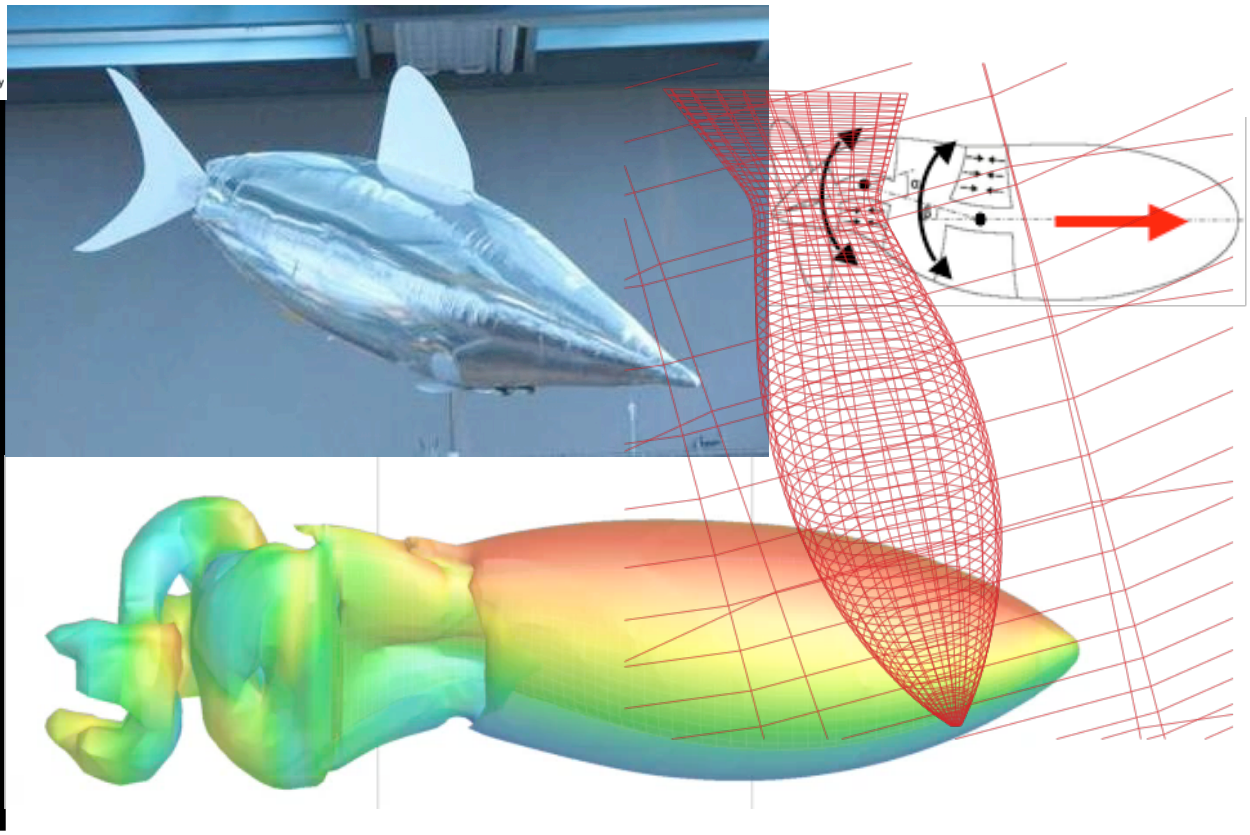
EMPA
Materials Science & Technology

Masters Thesis



CFD of Fish-like Airships

Computational Fluid Dynamics Simulations of airships with fish-like propulsion.

Today, **airships** are propelled by rotors. A new concept of propulsion involves the **mimicking of the tail-beat of a swimming fish**. The computational simulation of the fluid dynamics around a swimming fish has been performed for fishes like tuna and shark and for fish-like robots.

In our project we are interested in the fluid dynamics of fish-inspired flying bodies moving in air. Experiments and flight tests with a 3.5m long fish-like airship with a flapping tail-fin have been performed and several experimental data are available. The simulation of this reference case and eventually also the simulation of a airship with a flexible body using CFD tools employing advanced state of the art turbulence models will be the focus of this thesis. The CFD data along with experimental results will aid the **design of the actual airship.**

Method

Experimental data has been collected on a 3.5 m model airfish. In order to optimize the device parameters, CFD will be integrated with experimental results. The project involves the development of CFD tools, exploration of suitable turbulence models, validation studies and parametric studies in collaboration with experimentalists.

Contents

CFD modeling of fish-like Airships
Turbulence Models
Validation with Experiments

PREREQUISITES

Background in CFD
Independent work
Collaboration with Experimentalists

SUPERVISION

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CSE LAB

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In the CSE Lab we combine computational methods, computer science tools and do-