ETH zürich

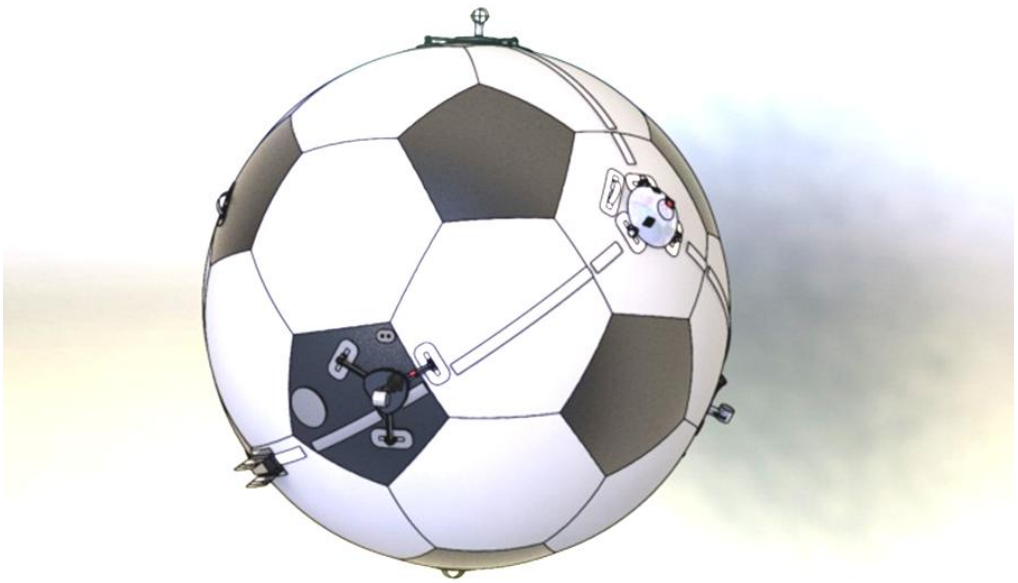
Estimation of Actuation Configuration for a Multi-Actuated Blimp

Semester Thesis

Students: Matthias Krebs, Simon Laube

Advisors: Kostas Alexis, Markus Achtelik

Overview

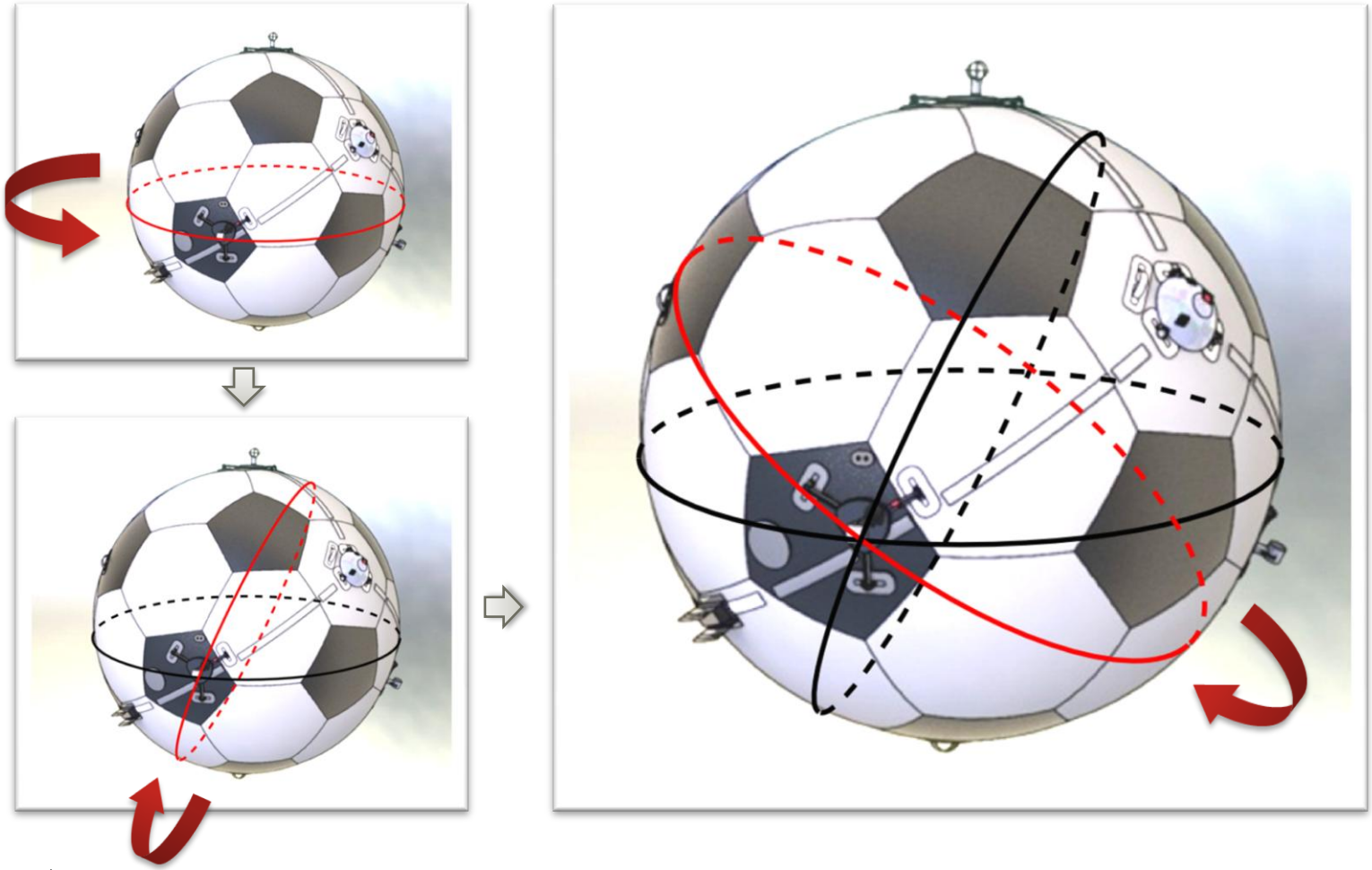


Problem: Motor to Blimp transformation is essential part of controller

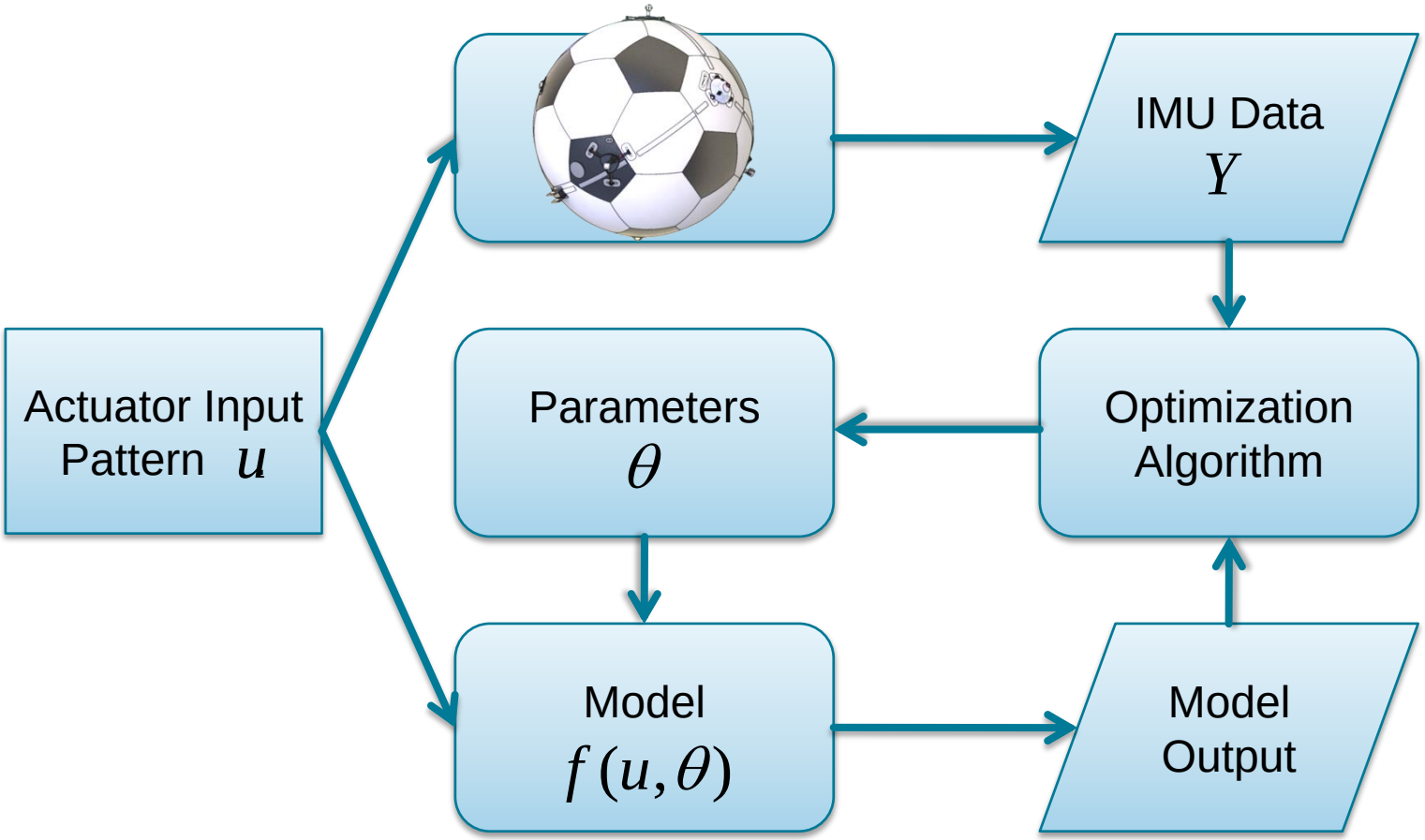
Idea: Create blimp model from Motor transformations and fit this model to the system

How: Actuate blimp and compare measurements with model output

Concept



Batch Optimization Process



Model Function

$$\vec{\alpha} = J^{-1}(r\, C(\theta)\, \vec{u} - \vec{\omega} \times J\vec{\omega})$$

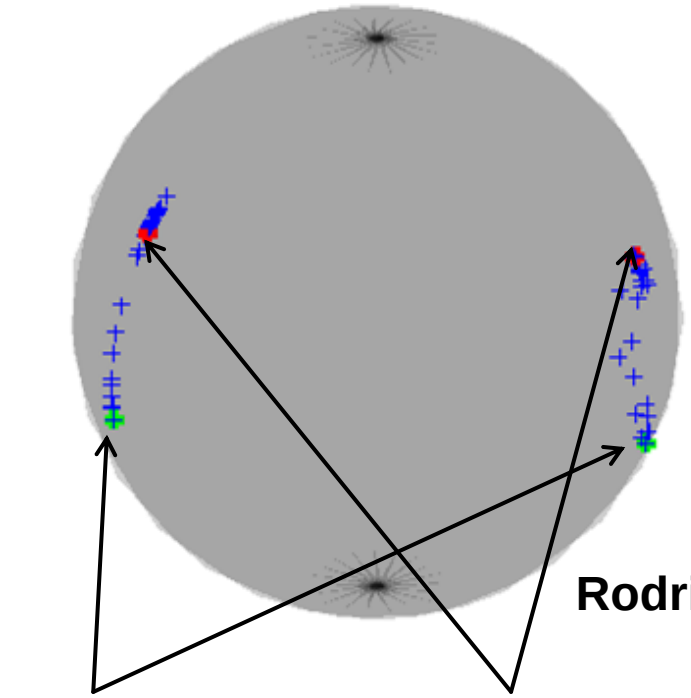
$C(\theta)$	Thrust force transformation
$\vec{u}$	Thrust force (input)
$\vec{\omega}$	Angular velocity
$\vec{\alpha}$	Angular acceleration
r	Radius
J	Inertia tensor

Parameterization

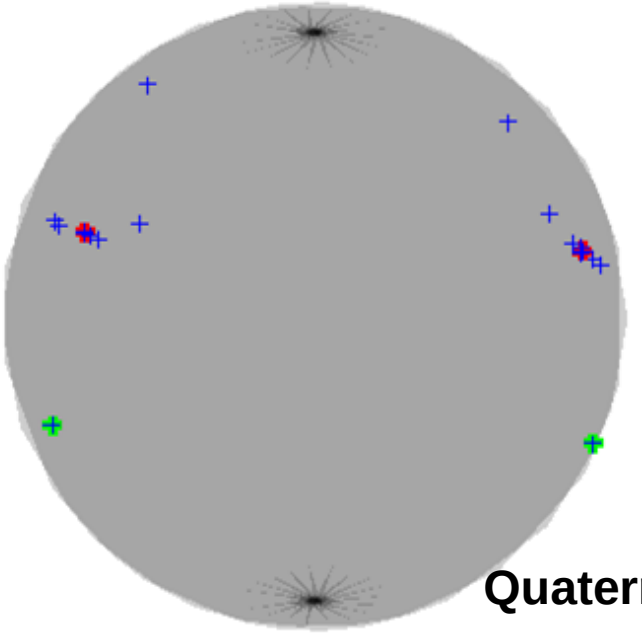
Gibbs-Rodriguez (3)
Quaternionen (4)

Current Results

- Iterative parameter optimization (2 actuation units)



Rodriquez



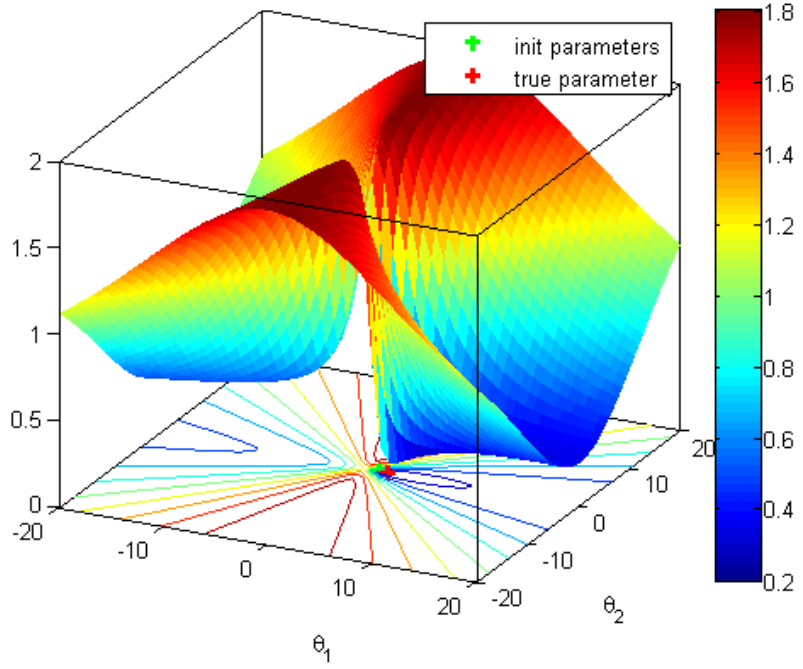
Quaternions

init position

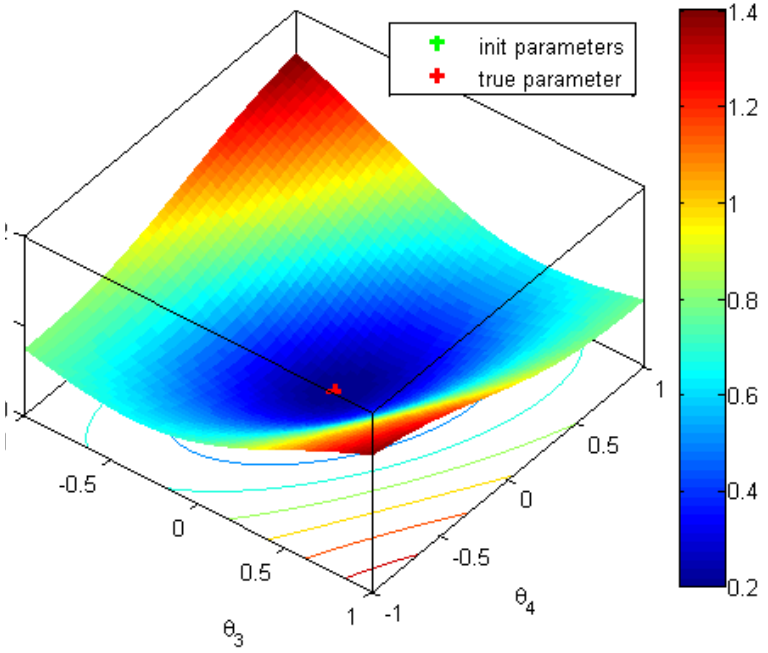
true position

Current Results

- Residual grid plots



Rodriquez



Quaternions

Outlook

- Parameterization for radius, inertia tensor
- Actuator input patterns
- Varied simulation data from modular simulation model
- Convergence analysis