



# Estimation of Actuation Configuration for a Multi-Actuated Blimp

Semester Thesis

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# Overview

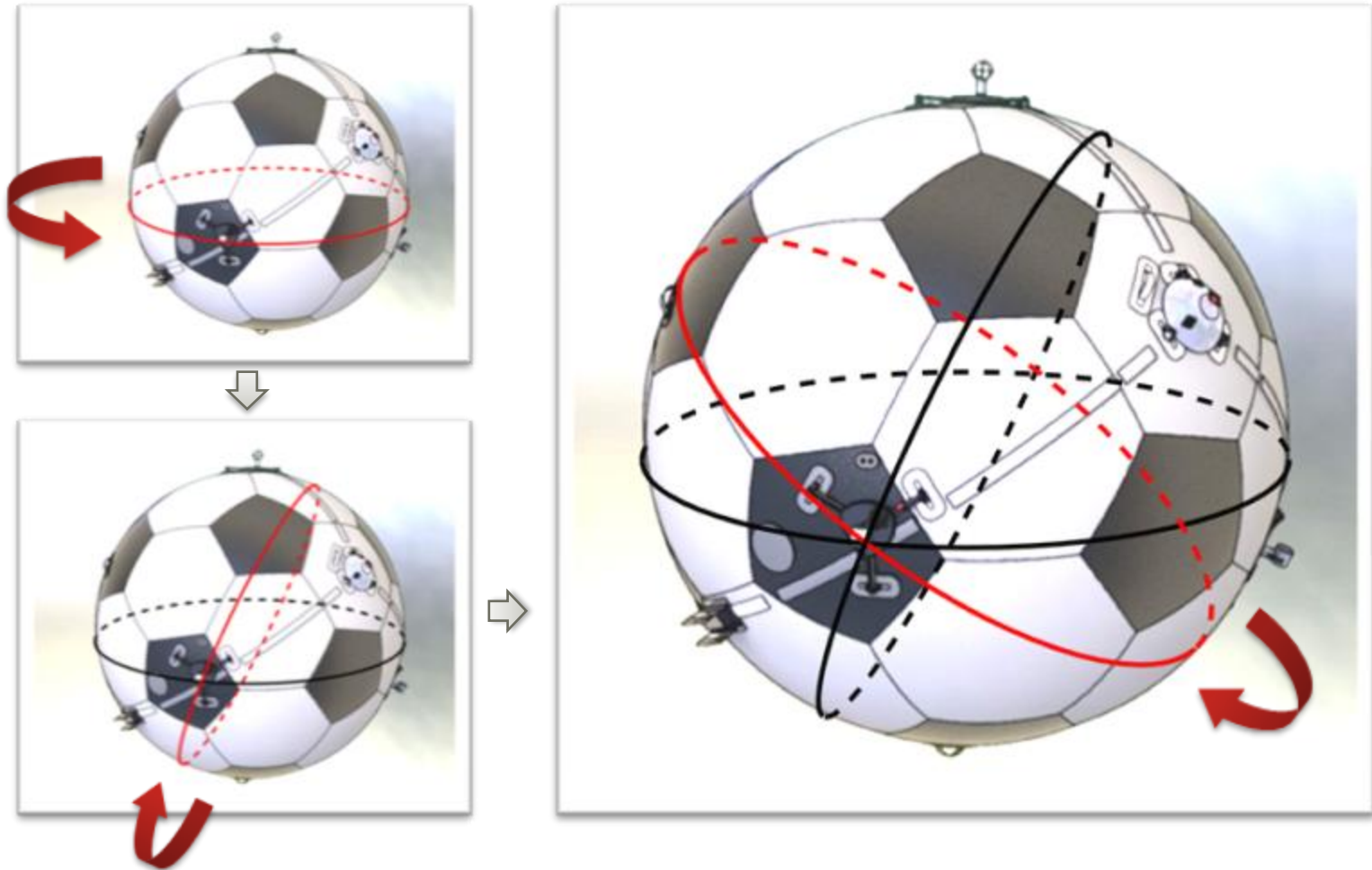


**Problem:** Motor to Blimp transformation is essential part of controller

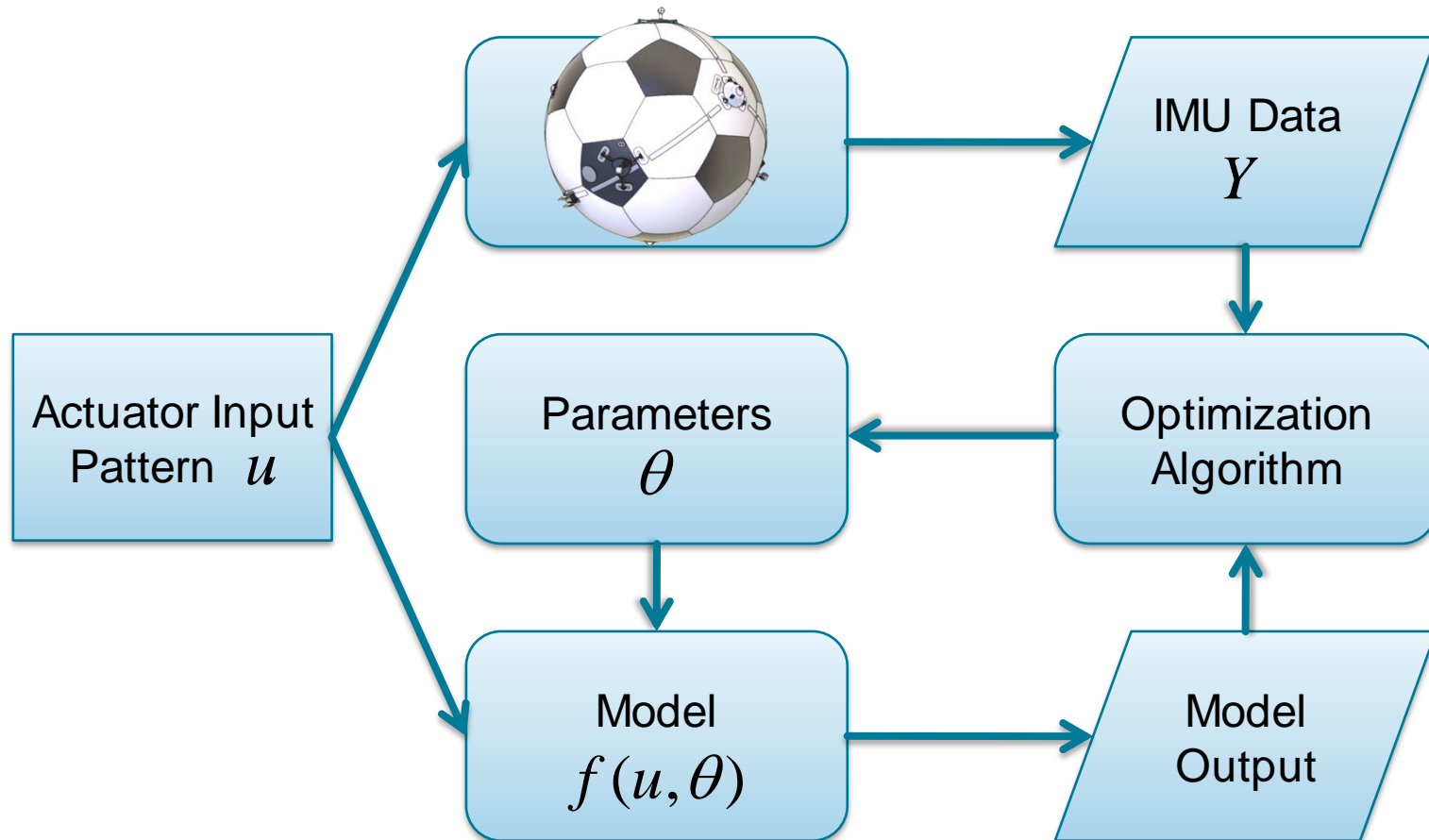
**Idea:** Create blimp model from Motor transformations and fit this model to the system

**How:** Actuate blimp and compare measurements with model output

# Concept



# Batch Optimization Process



# Model Function

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

$\mathcal{C}(\theta)$  Thrust force transformation

$\vec{u}$  Thrust force (input)

$\vec{\omega}$  Angular velocity

$\vec{\alpha}$  Angular acceleration

$r$  Radius

$J$  Inertia tensor

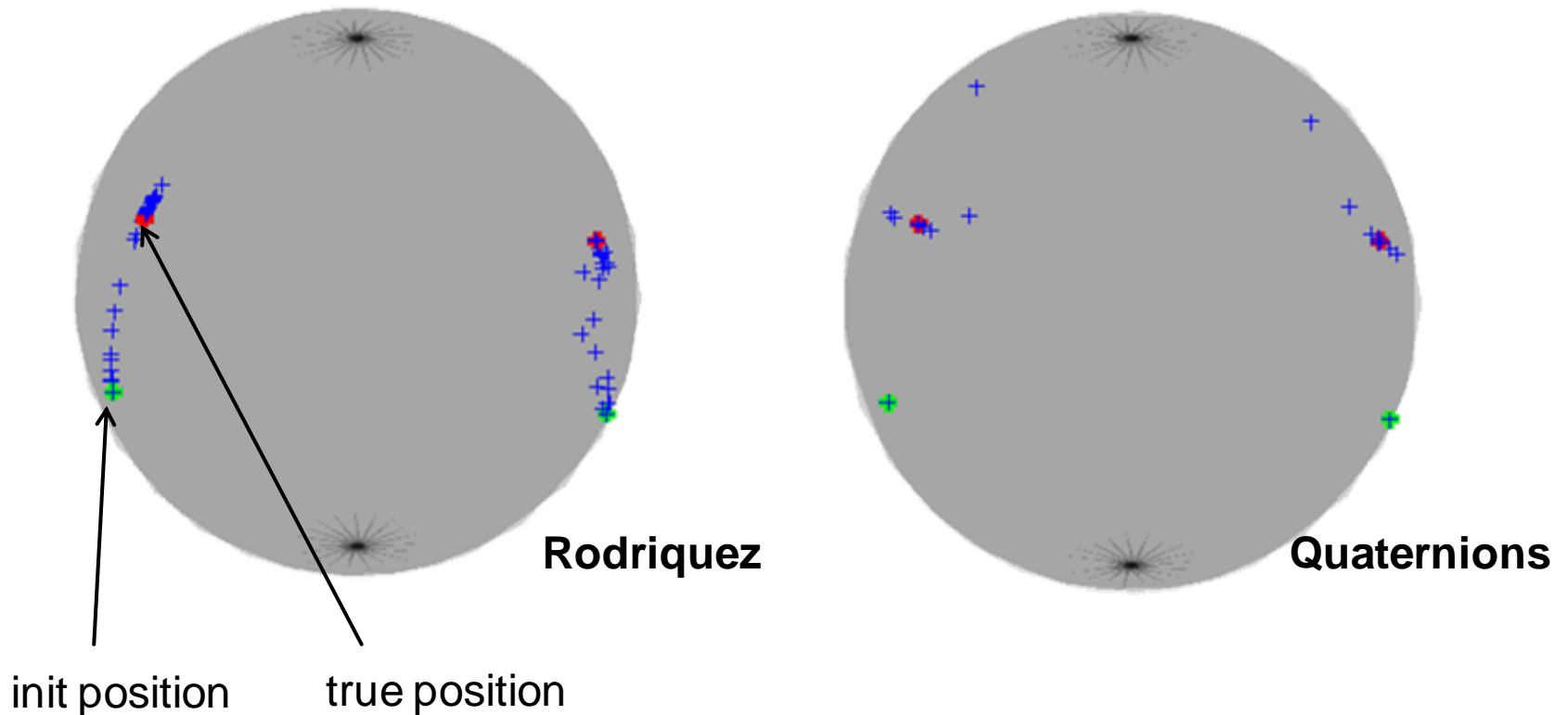
# Parameterization

Gibbs-Rodriguez (3)

Quaternionen (4)

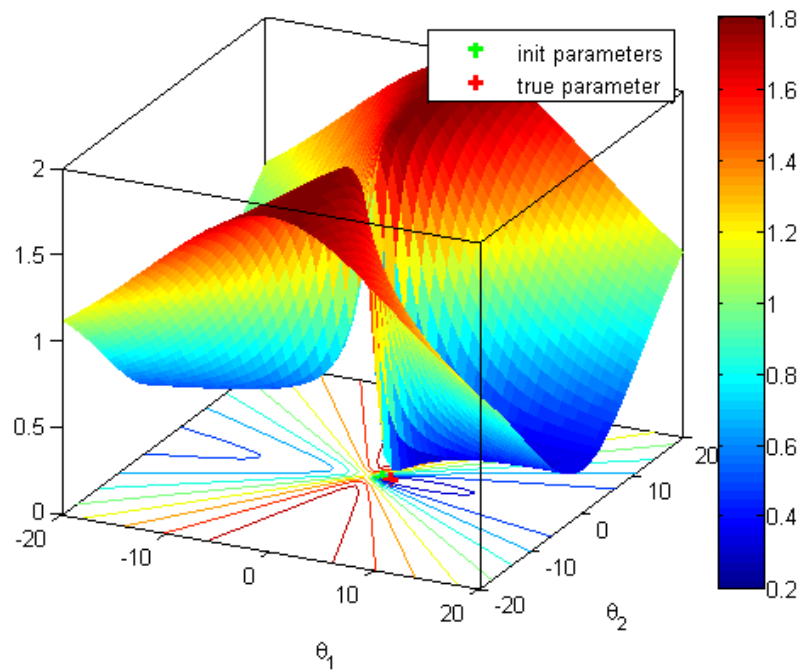
# Current Results

- Iterative parameter optimization (2 actuation units)

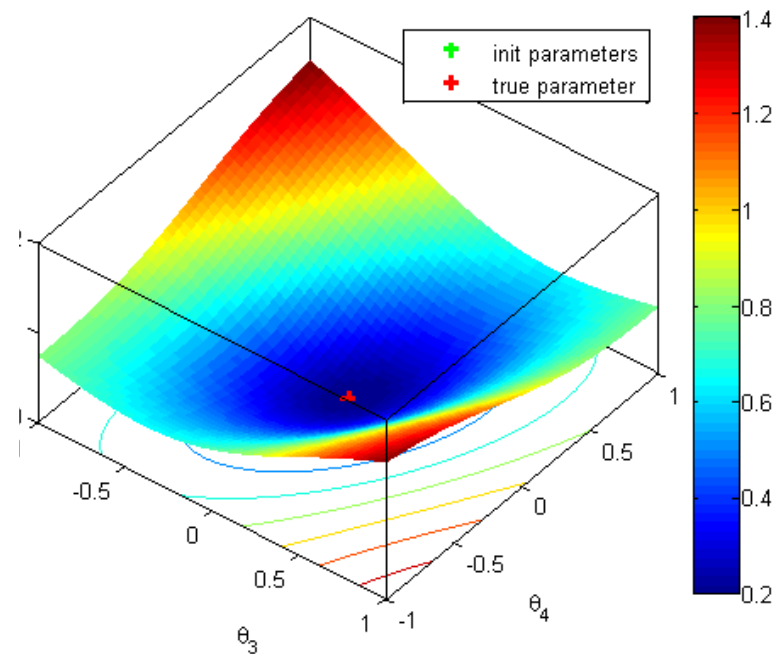


# Current Results

## ■ Residual grid plots



Rodriquez



Quaternions

# Outlook

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



