SMALL SCALE FREE FLOATING SIMULATOR

A HYBRID APPROACH

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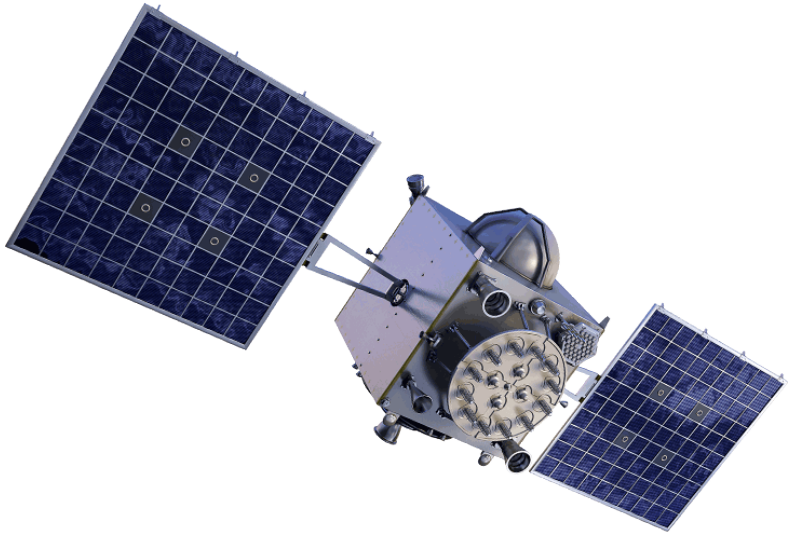
(Credit: NASA)

Goal: a Ground Based Simulator

Applied force



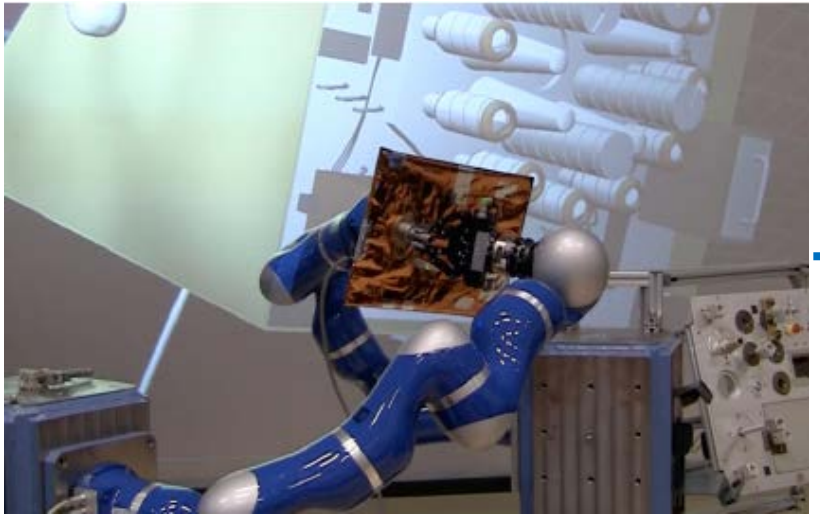
Position

=

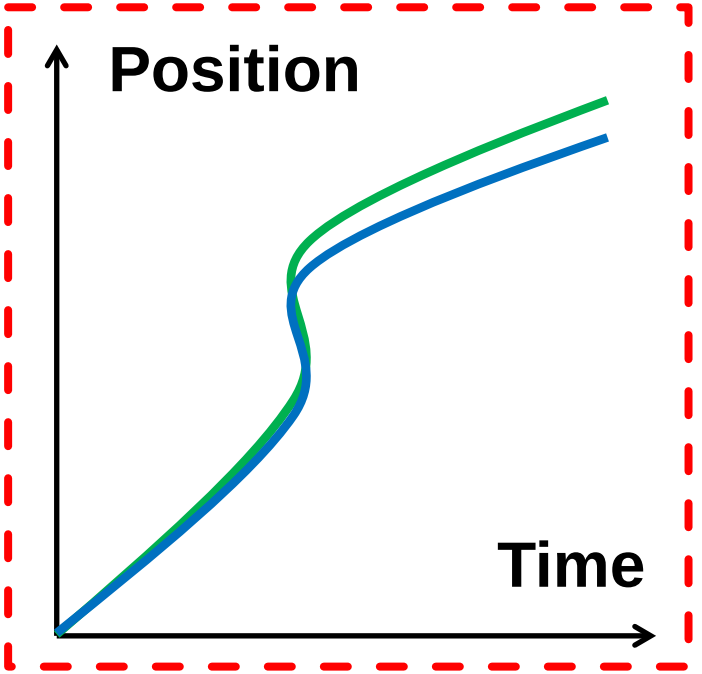
?

=

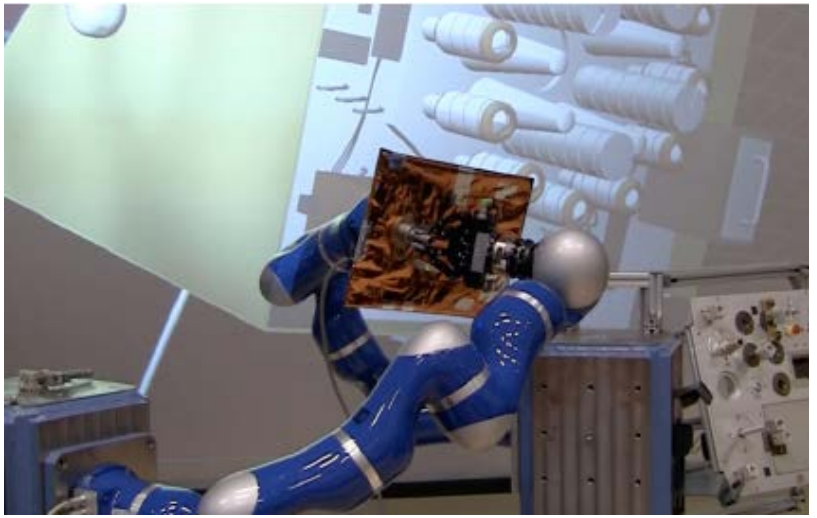
Applied force

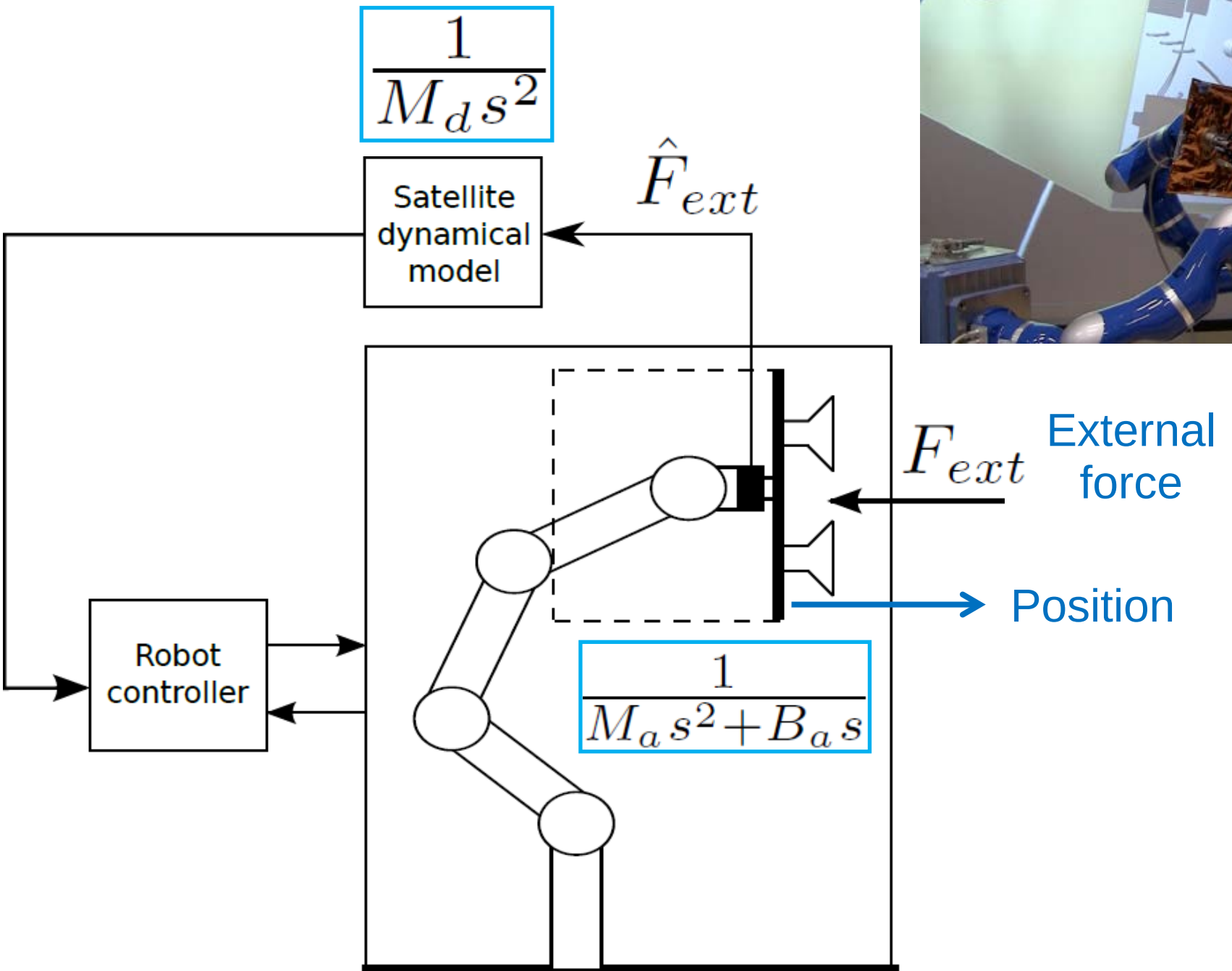


Position

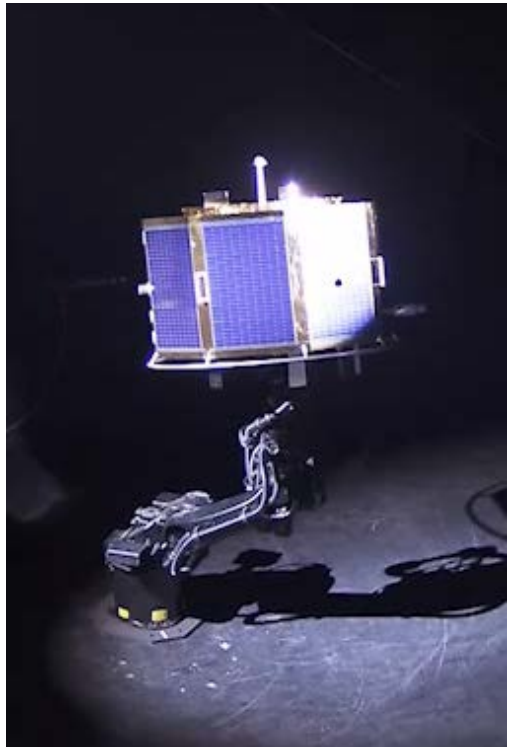


Ground Based Simulator





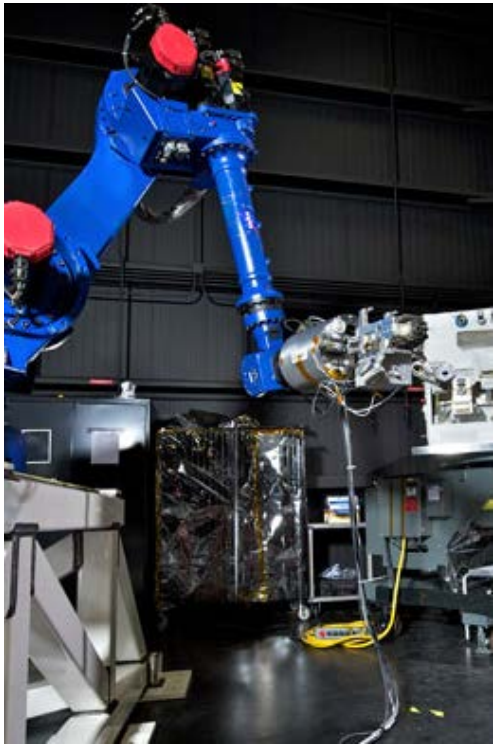
Some of the Existing Facilities



LDMSS
DFKI Bremen[1]

EPOS 2.0
DLR Oberpfaffenhofen[2]

DEOS SIM
DLR Oberpfaffenhofen[2]

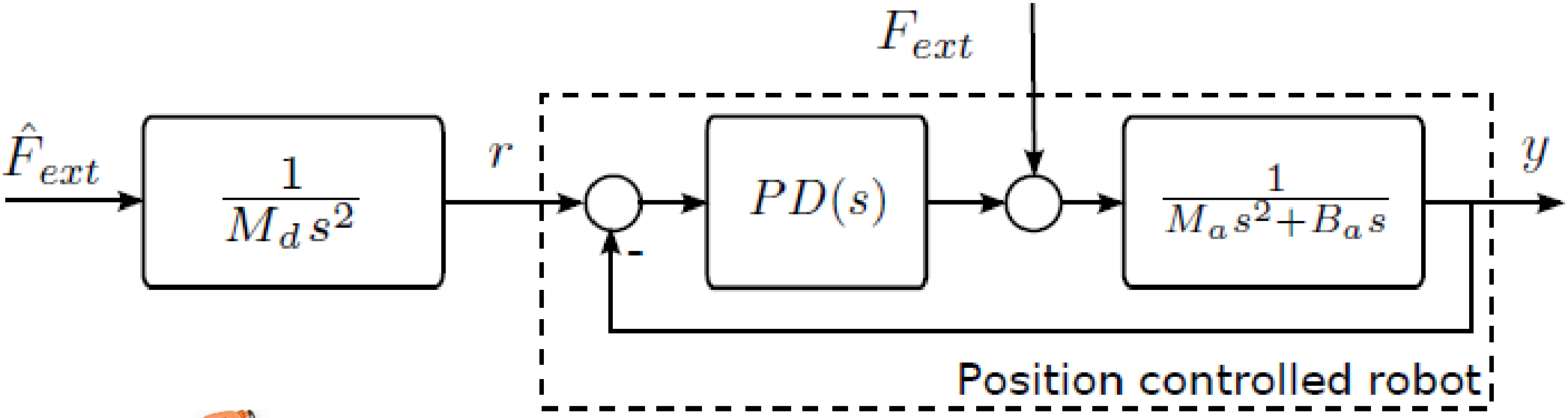


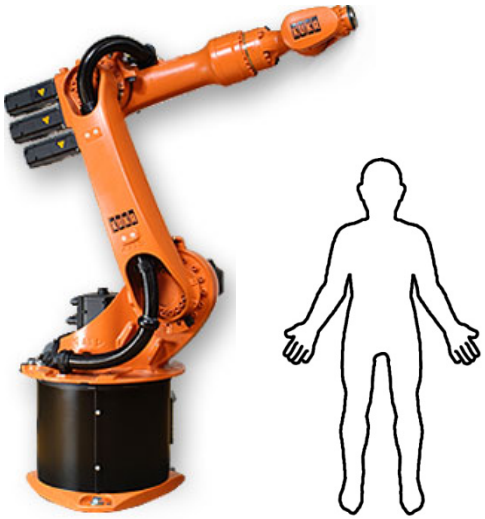
RRM
NASA GSFC[3]

Industrial COTS robots, 50-100kg payloads, position control with ~10ms cycle time

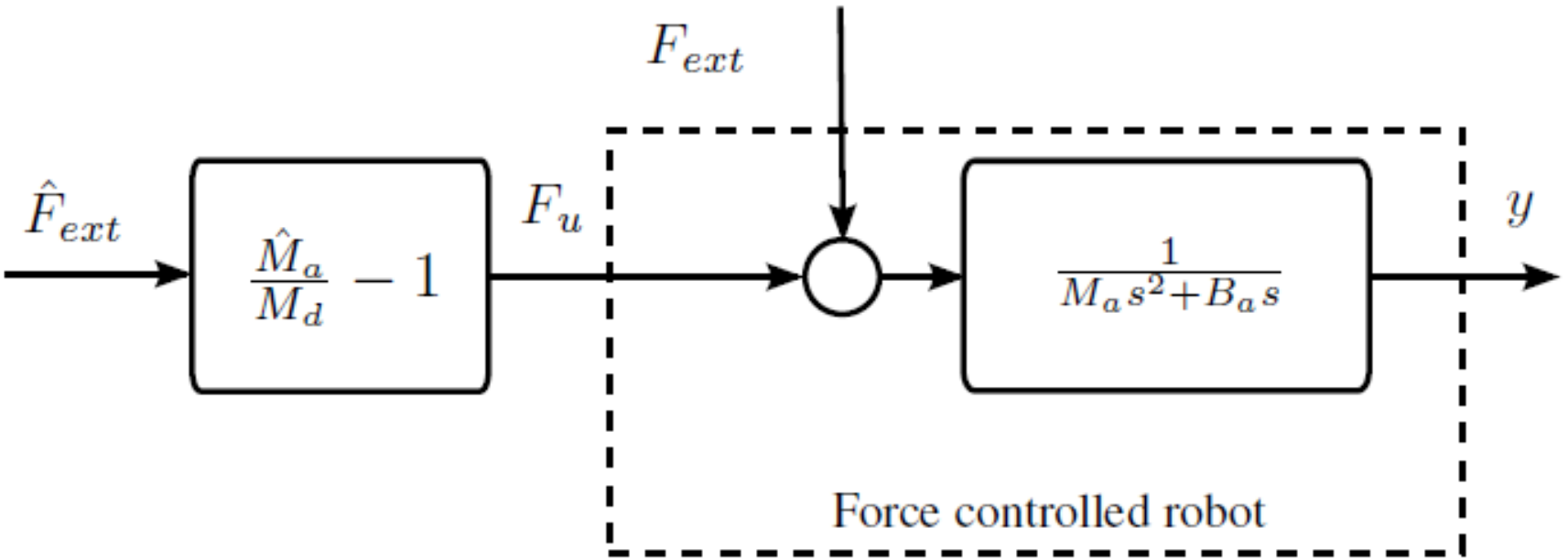
[1]http://robotik.dfki-bremen.de
[2]http://www.dlr.de
[3]http:// *ssco.gsfc.nasa.gov*

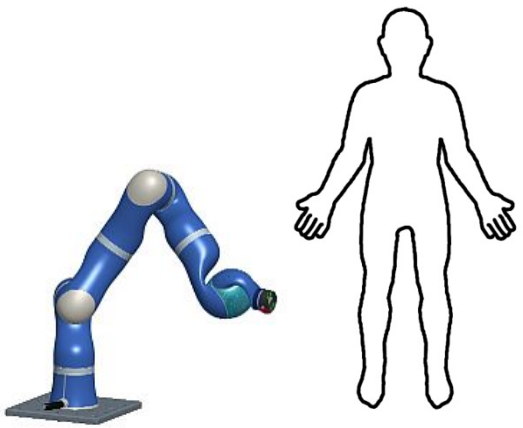
Approach I – Position Control



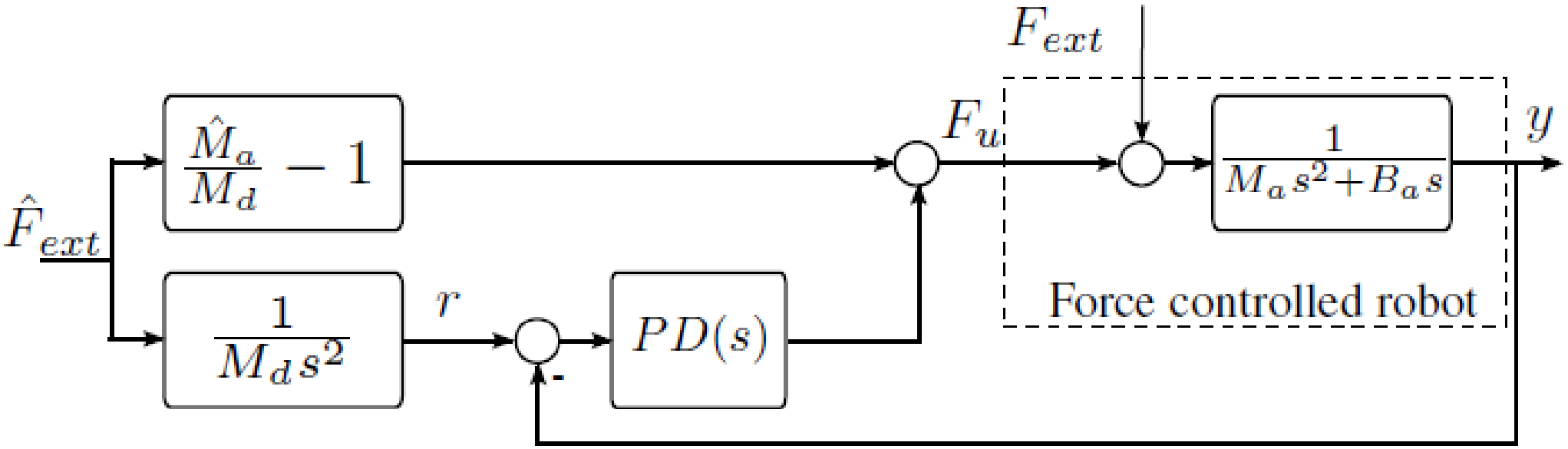


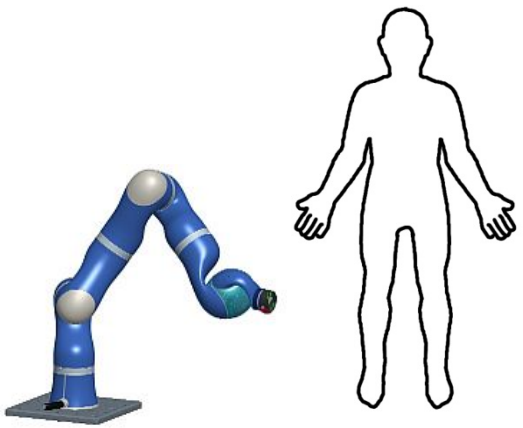
Approach II – Torque Control



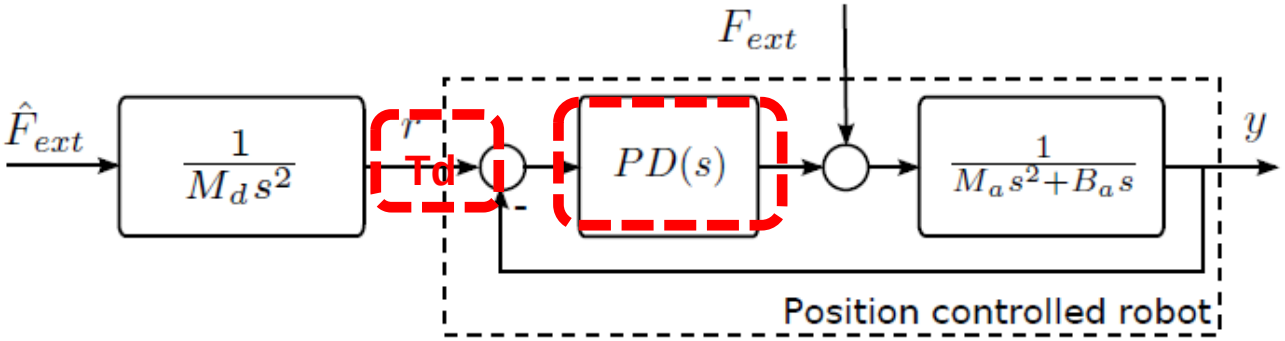


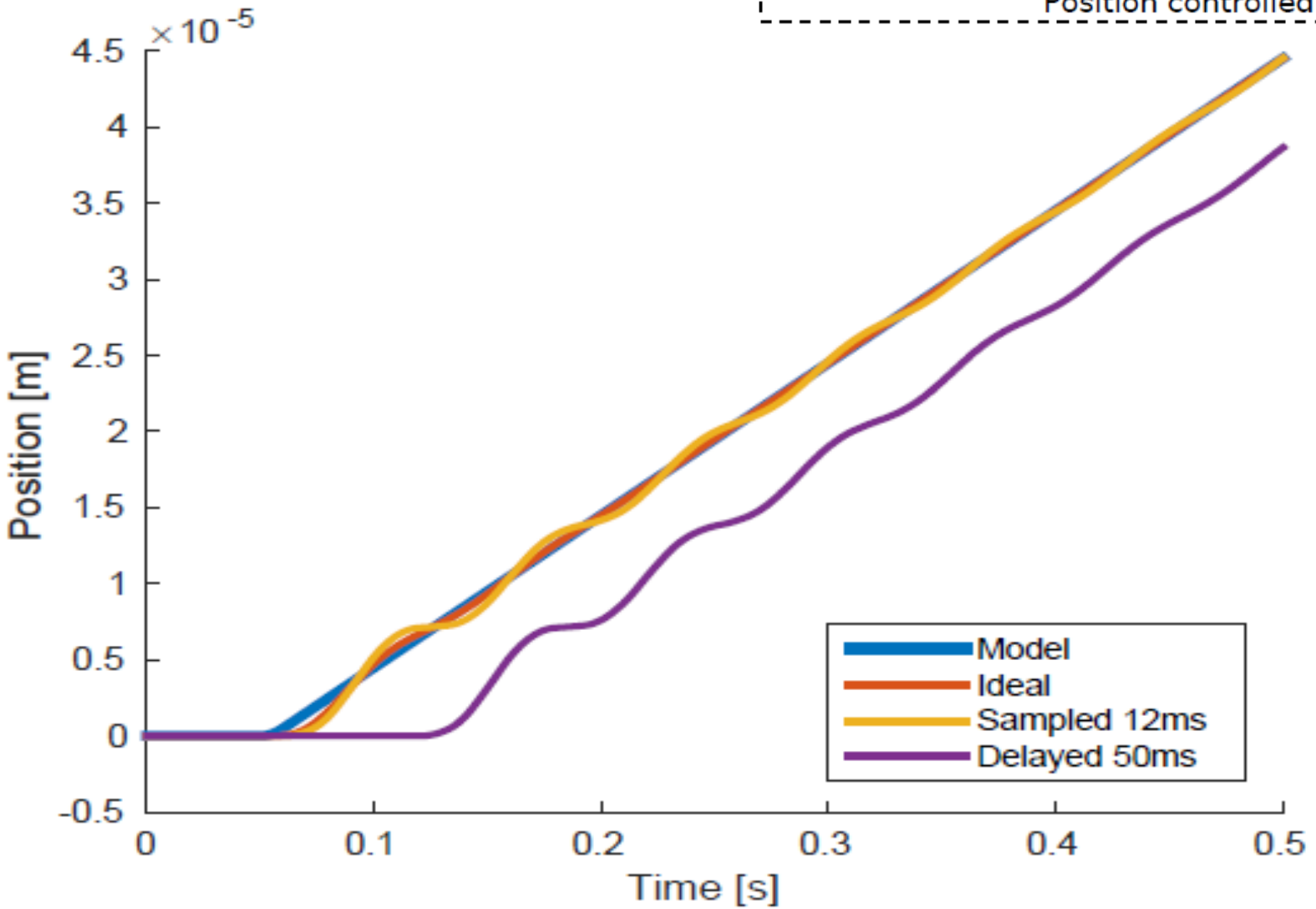
Approach III – Hybrid Control



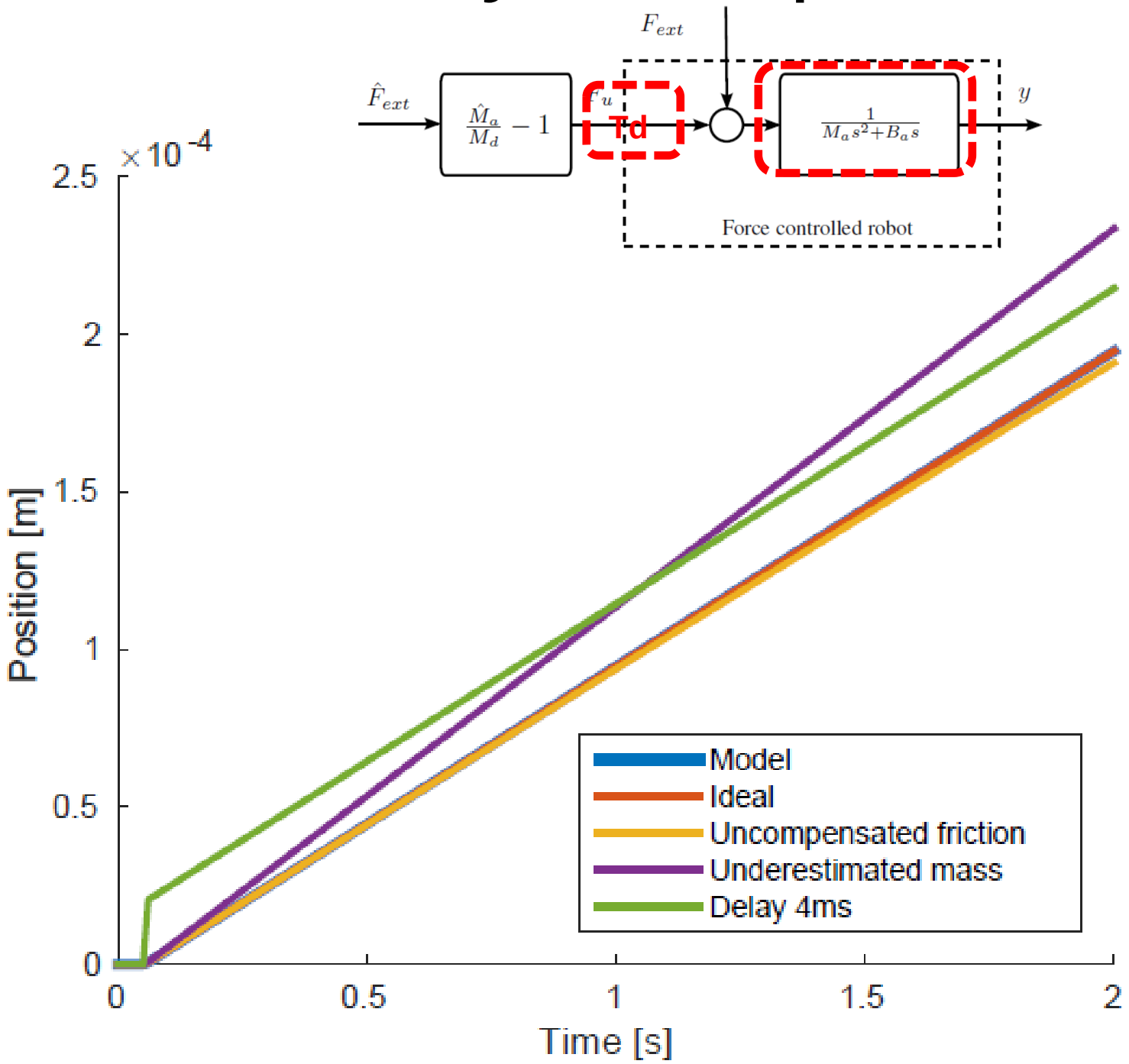


Simulation Study – Position Control

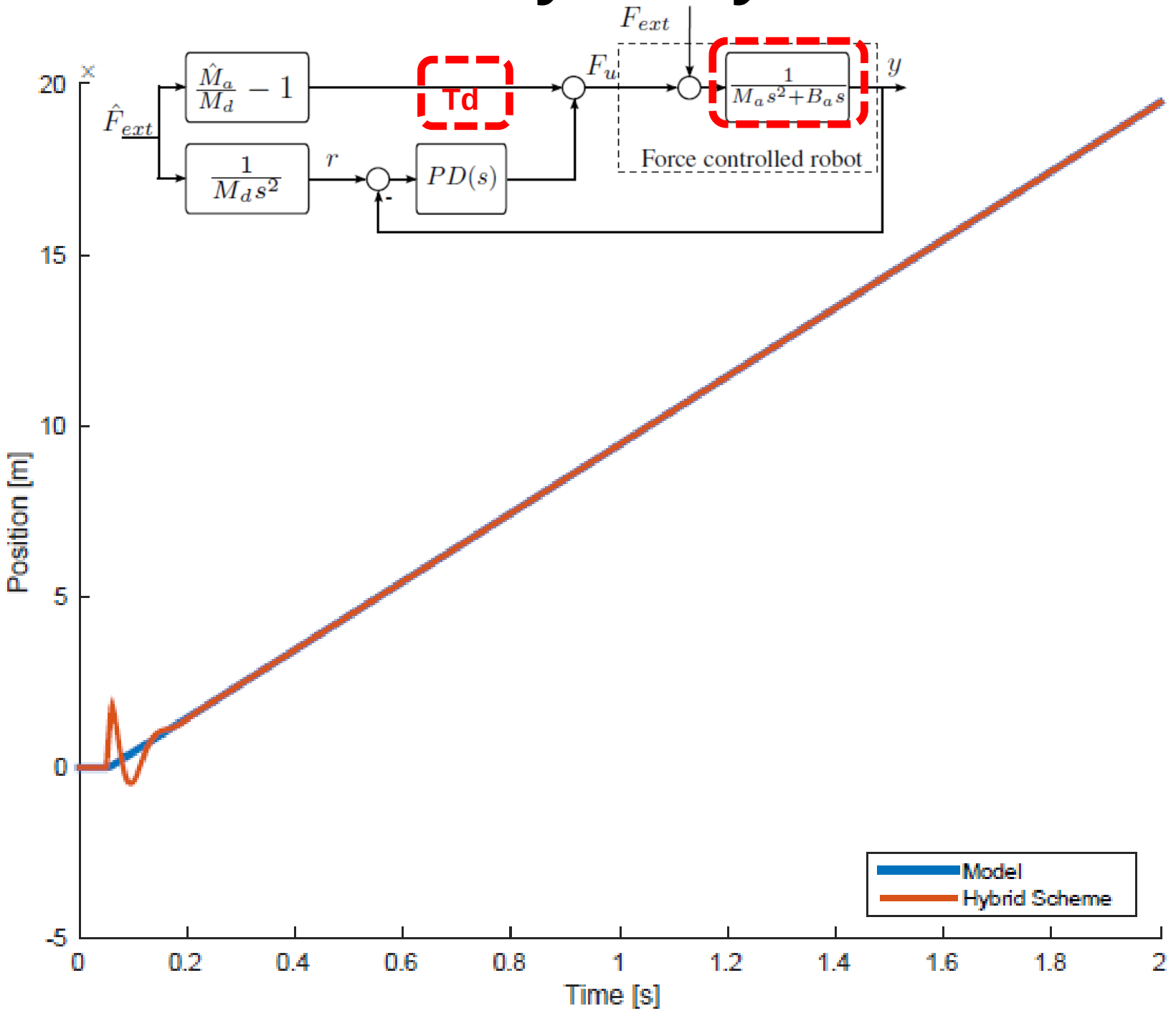




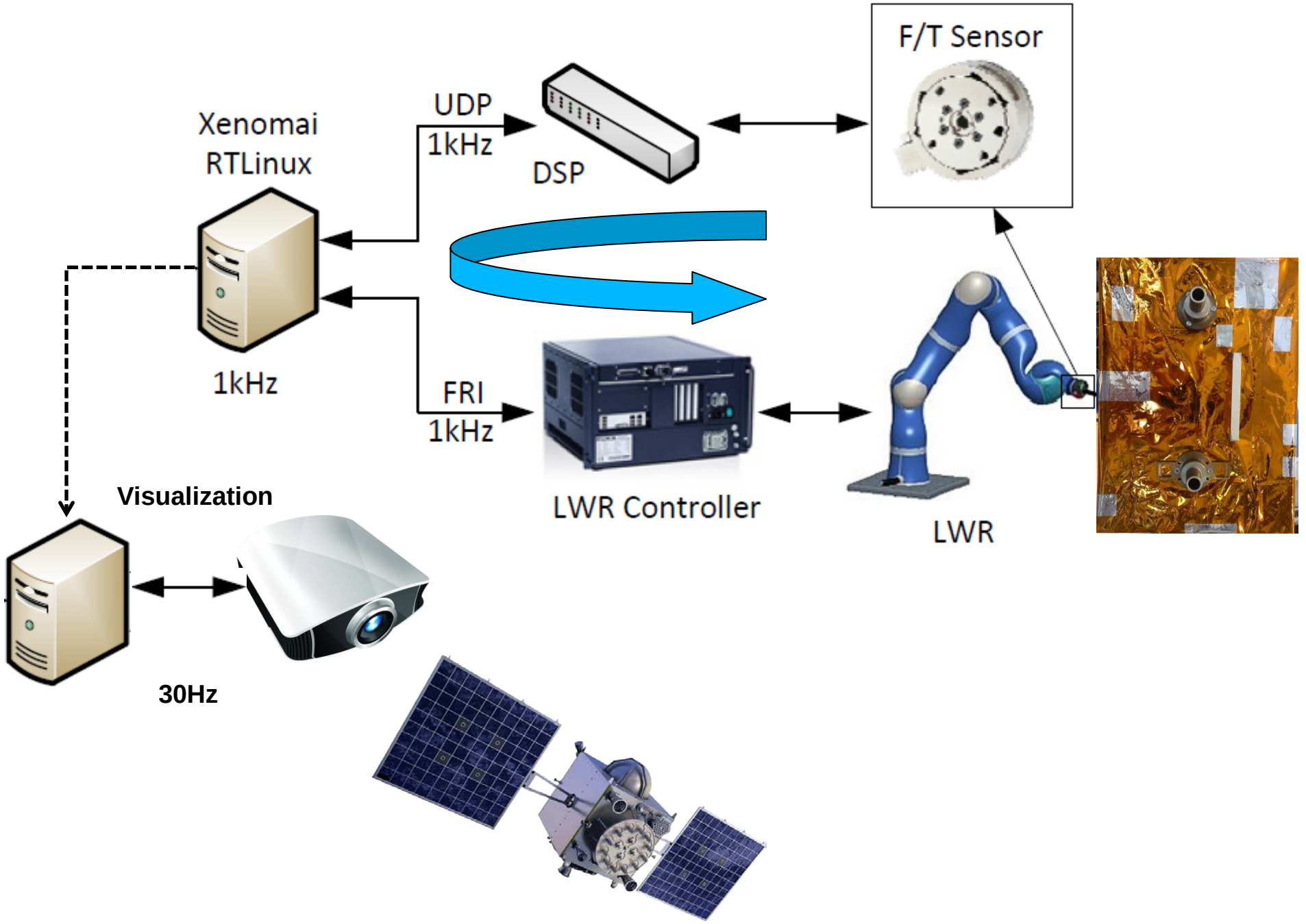
Simulation Study – Torque Control



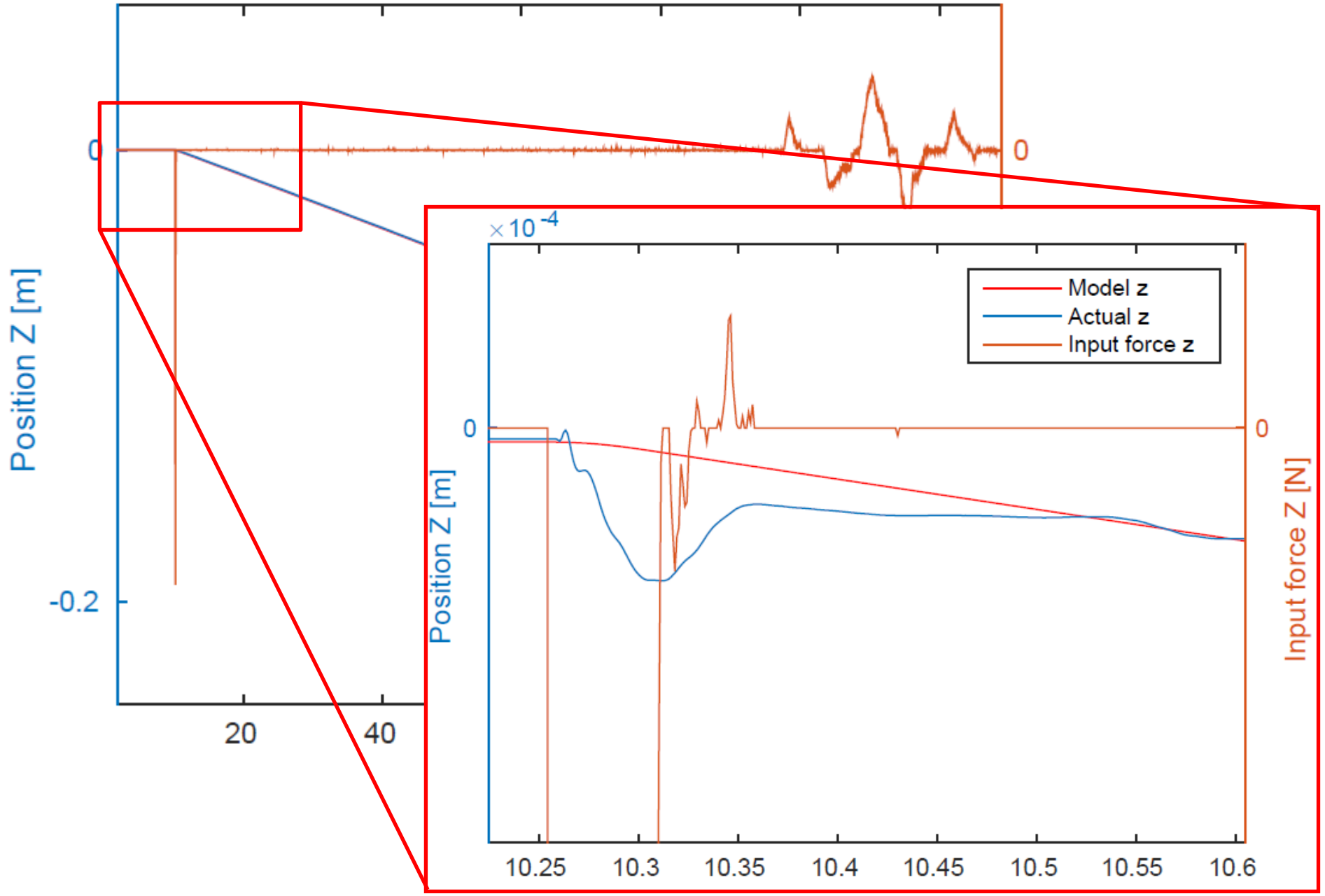
Simulation Study – HybridControl

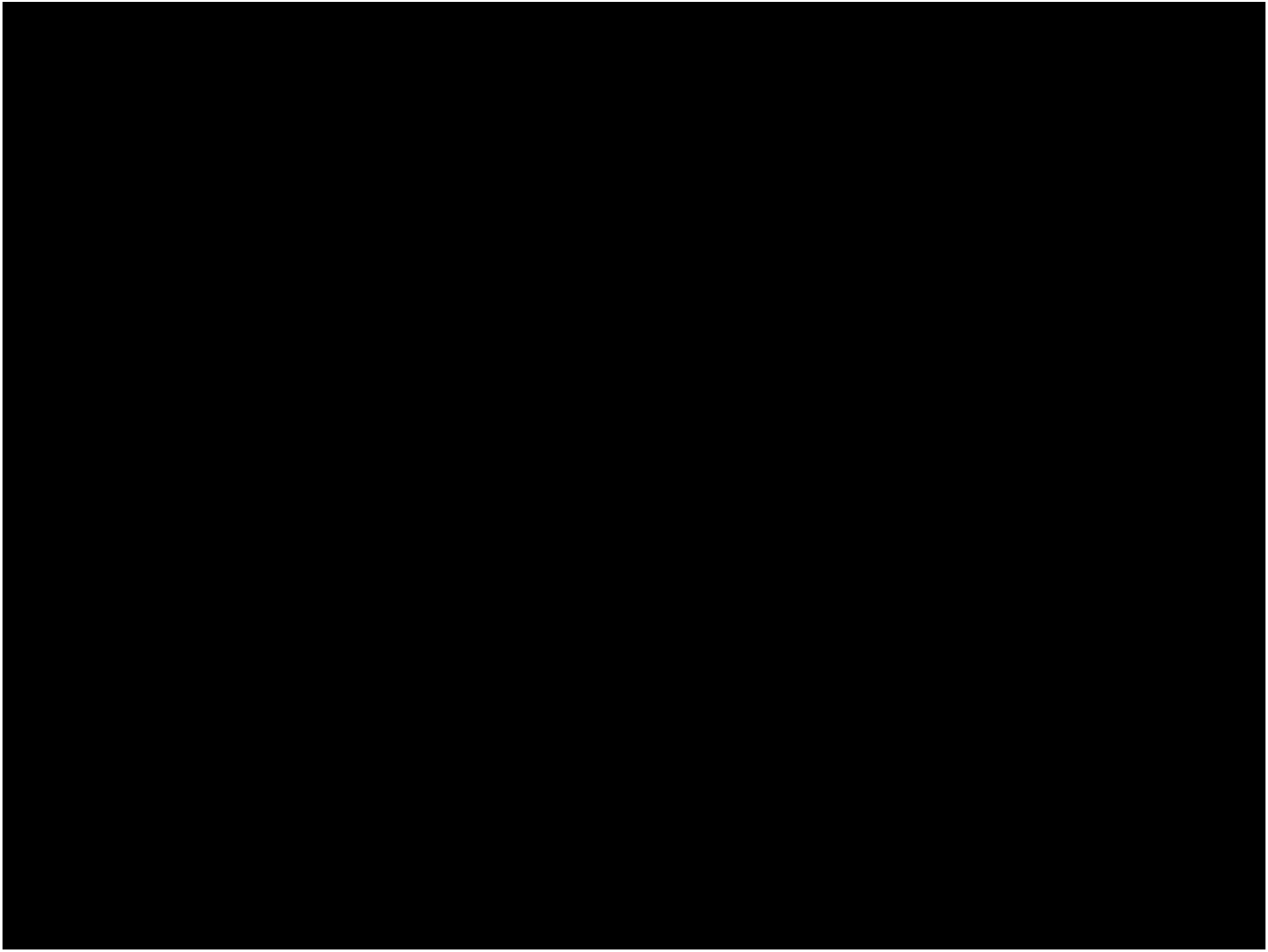


Experimental Setup



Experimental Validation





Conclusions

- Hybrid controller is a viable approach
- Chaser satellite needs to be implemented
- Comparison across simulation facilities

Thank you for you attention!

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