Boeing Discrepancy Modeling & Digital Twin

Ashis-Steve-Nathan Meeting Notes 4-4-19

* Steve Notes:
  + Literature Review
    - Download Bibtex
    - Lit Review for 10 hours
    - See overlap of digital twin and robotic control
    - Find 2-3 main papers on topic
* Goal: put steve and nathan’s methods into these models
* Tony Model: Kinematic model w/ series elastic actuator
* Easy Paper: take into account histerisis
* Nathan: Digital twin of the porato frontier
  + Need to determine what is easy/medium/hard physics
  + That they can be supported with black box
* Understand how to collect data from Tony’s experiment
* Note: may have little phase creep… but not worth focusing on because there may be feedback control
* May want to switch to different manifolds for kinematic models
  + Aka: if matrix is invertible
  + Hand off to wich twin is more accurate
  + Revolute joint: singularities are known
  + Are joints: over or under actuated
  + Snake style: over actuated joint
  + Sam Pedigo and Jim Butryck can help determining best model for system
* Pick Model
  + Read: Haad libson curiosity robotics

Ashis-Tony Meeting Notes 4-9-19

* Forward and inverse dynamics are based on the CAD
* There is some histerisis but tony said it is within tolerance
* 4 revolute joint model
* Reverse newton/euler or langrangian works for kinematics
* Rigit body dynamics are fairly accurate
* Torque control is what is happening
  + Measuring torque with compression of the spring?
* 4 actuators in series, but only 1 is used for understanding
* Note: inverse kinematics is well established
* System model: SEA model
  + Less known to Ashis
  + Start with simple SEA model – textbook controllable model
  + Simple SEA model series E
  + And then expand ☺

Goals:

1. Learn SEA model
2. Learn HEBI framework
3. Learn data collection