Robust Control Workshop

AAS GNC Conference
Breckenridge, CO
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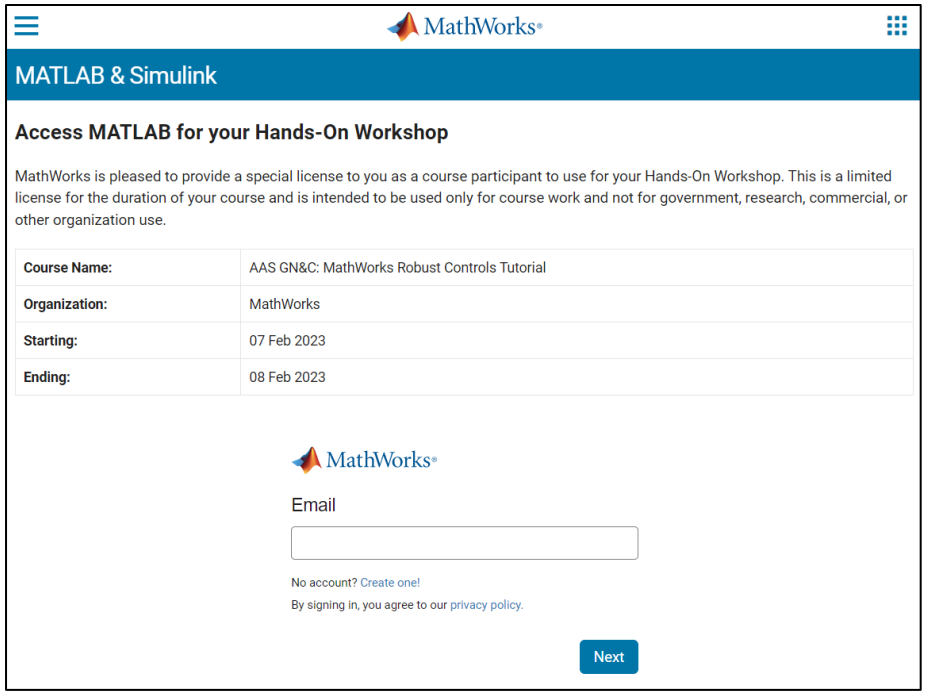
Robust Control Workshop – Set-up Instructions

Get to MATLAB Online:

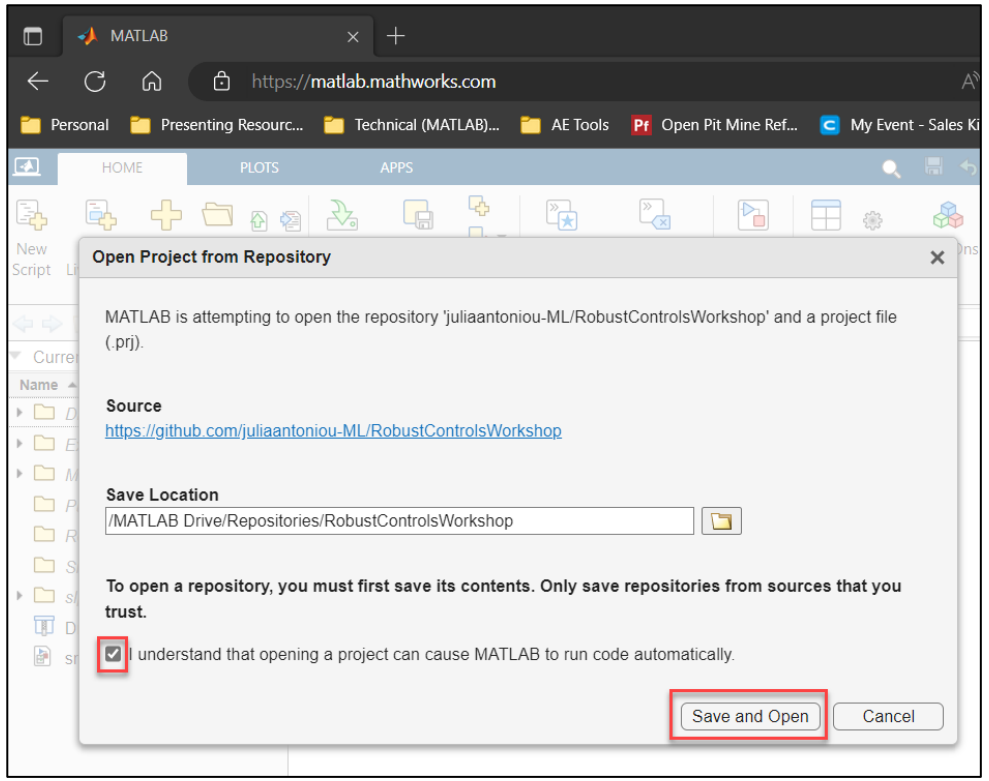
1. https://tinyurl.com/bdz8acw4
2. Create a mathworks.com account or sign into an existing one.

   For this workshop, you can use any email – it doesn't have to be a work email associated with a MATLAB license.
3. Click "Access MATLAB Online"



Once you're at matlab.mathworks.com:

1. Use this link to clone the workshop files: https://tinyurl.com/5k6bwt7s
2. Select the checkbox and choose "Save and Open"
3. A live script for "Step1" will automatically open.



Robust Control Workshop - Agenda

- Part 1: Classic Control Design Basics

Lunch Break

- Part 2: Robust Control Analysis

Coffee Break

- Part 3: Robust Control Design

Appendix

- Exercise 1: Tuning of Gain Scheduled Controller for a Three-Loop Autopilot
- Exercise 2: MIMO Stability Margins for a Spinning Satellite
- Exercise 3: Robust Controller Design for a Spinning Satellite

Behind the Headlines

Blogs

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Mission accomplished, now it's time to crash?

Posted by **Lisa Harvey**, September 29, 2016 — 19 views (last 30 days) | 0 Likes | 0 comment

Imagine traveling twelve years in pursuit of a comet that is streaking along at 24,600 miles per hour only to crash into the comet. Twelve years. 4.9 billion miles. Untold hours of science and engineering manpower invested in this project and it's going to crash?

Yet that is exactly what's about to happen to the Rosetta comet chaser. That is, as long as everything goes according to plan. And *BBC* will be covering it live.

Tomorrow, the twelve-year-long European Space Agency (ESA) mission's probe is going to intentionally crash land, albeit slowly, into the comet it has been trailing.

The mission

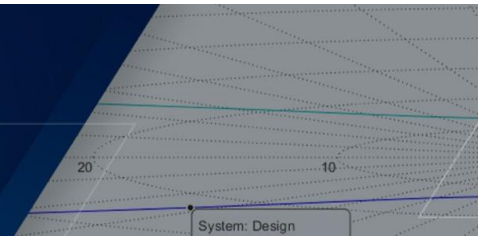
ESA's Rosetta probe was launched on 2 March 2004 in order to rendezvous with comet 67P. Rosetta's prime objective is to help understand the origin and evolution of the Solar System. According to ESA, "The comet's composition reflects the composition of the pre-solar nebula out of which the Sun and the planets of the Solar System formed, more than 4.6 billion years ago. Therefore, an in-depth analysis of comet 67P by Rosetta and its lander will provide essential information to understand how the Solar System formed."

Artist's impression of the Rosetta orbiter deploying the Philae lander to comet 67P/Churyumov–Gerasimenko. Image credit: ESA–C. Carreau/ATG medialab

[Link to the article]

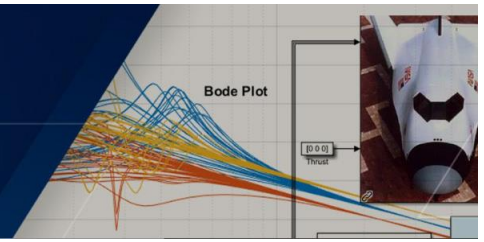
Control Systems Product Suite

Control System Toolbox
Design and analyze control systems

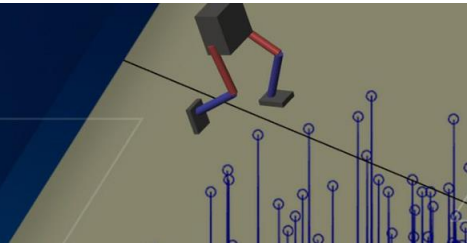


Model Predictive Control Toolbox
Design and simulate model predictive controllers

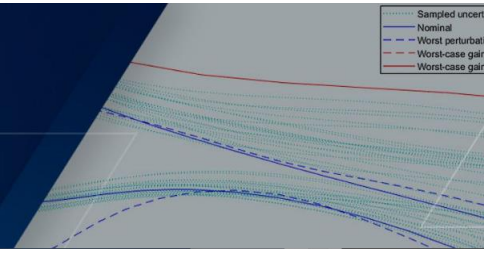
Simulink Control Design
Linearize models and design control systems



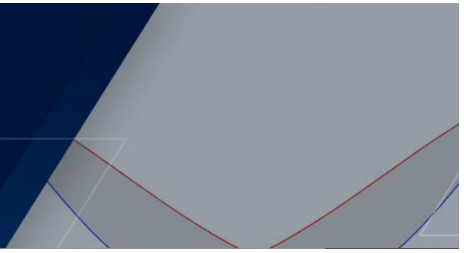
Reinforcement Learning Toolbox
Design and train policies using reinforcement learning



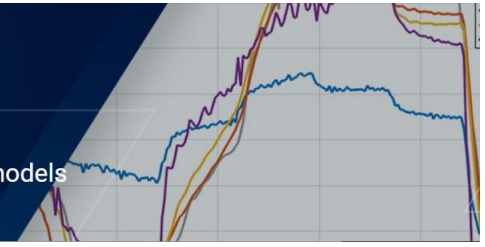
Robust Control Toolbox
Design robust controllers for uncertain plants



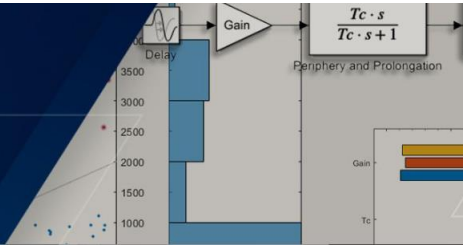
Fuzzy Logic Toolbox
Design and simulate fuzzy logic systems



System Identification Toolbox
Create linear and nonlinear dynamic system models from input-output data



Simulink Design Optimization
Analyze model sensitivity and tune model parameters



Online Courses

Getting Started

MATLAB Onramp

Deep Learning Onramp

Reinforcement Learning Onramp

Machine Learning Onramp

Image Processing Onramp

Signal Processing Onramp

Optimization Onramp

Simulink Onramp

Control Design Onramp with Simulink

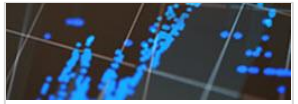
Stateflow Onramp

Simscape Onramp

Circuit Simulation Onramp

MATLAB

MATLAB Fundamentals



MATLAB for Data Processing and Visualization

MATLAB Programming Techniques

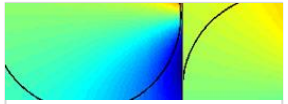
Deep Learning with MATLAB

Machine Learning with MATLAB

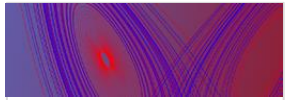
Image Processing with MATLAB

Computational Mathematics

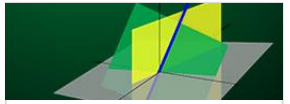
* Available exclusively for users with Online Training Suite



Solving Nonlinear Equations with MATLAB



Solving Ordinary Differential Equations with MATLAB



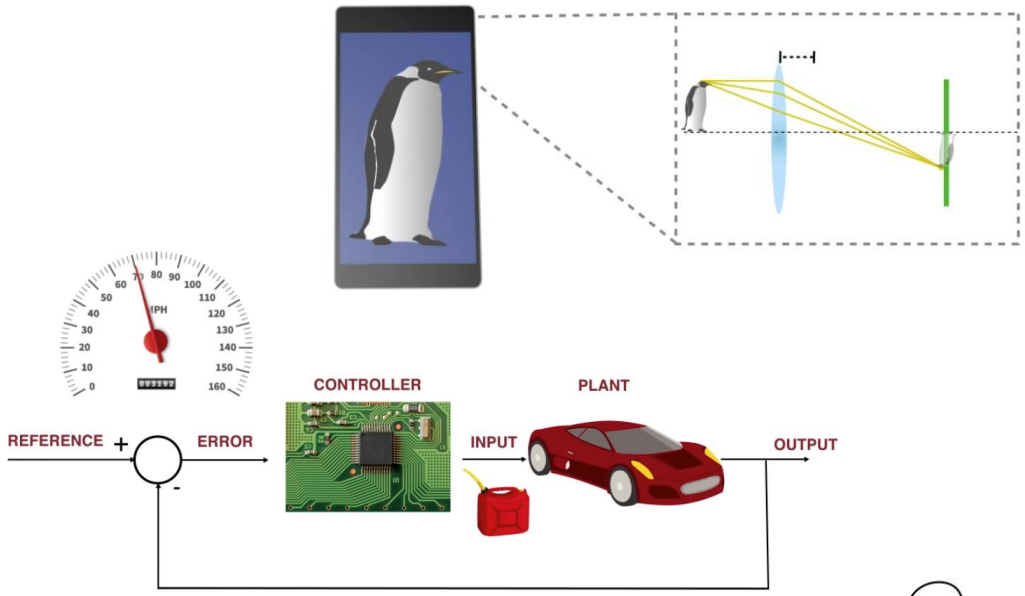
Introduction to Linear Algebra with MATLAB

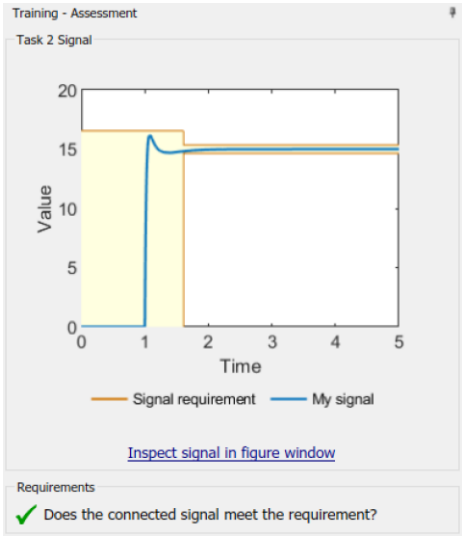
Introduction to Statistical Methods with MATLAB

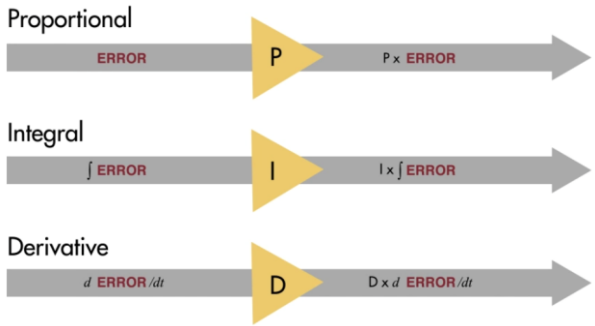
Introduction to Symbolic Math with MATLAB

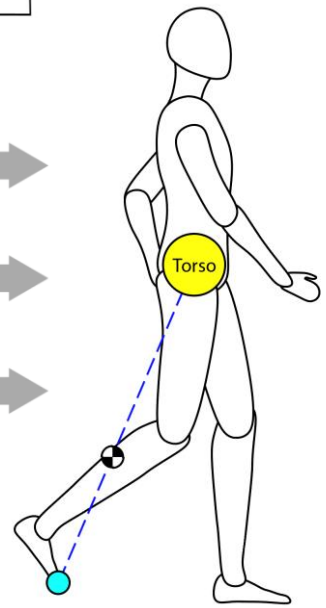
Control Design Onramp with Simulink

- Free, short course on the basics of linear analysis and feedback control design in Simulink
- Interactive exercises
- Automated assessments & immediate feedback
- Access from Simulink (from R2020b on)
- Topics include:
  - Linearize nonlinear plants
  - Common linear analysis
  - Feedback control
  - Automatic PID controller tuning









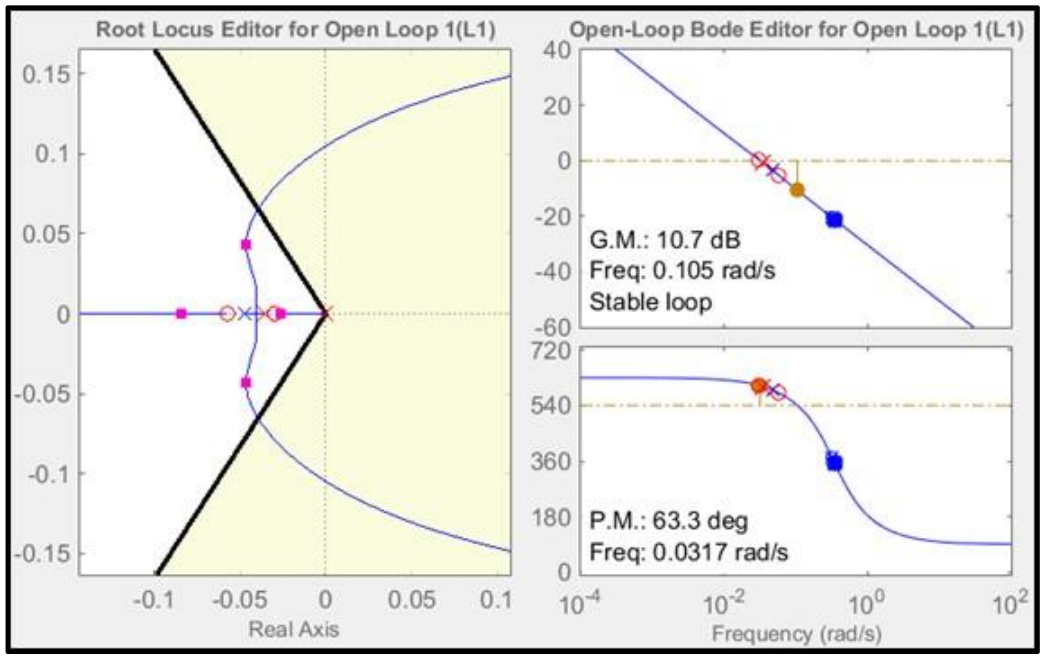
Self-Paced

Control System Design with MATLAB and Simulink

Topics included in this 2-day course:

- Control system design, modeling and analysis
- System identification
- Parameter estimation
- Response optimization
- Linearization
- Controller implementation

[See detailed course outline]



MATLAB Tech Talks - Controls

https://www.mathworks.com/videos/tech-talks/controls.html