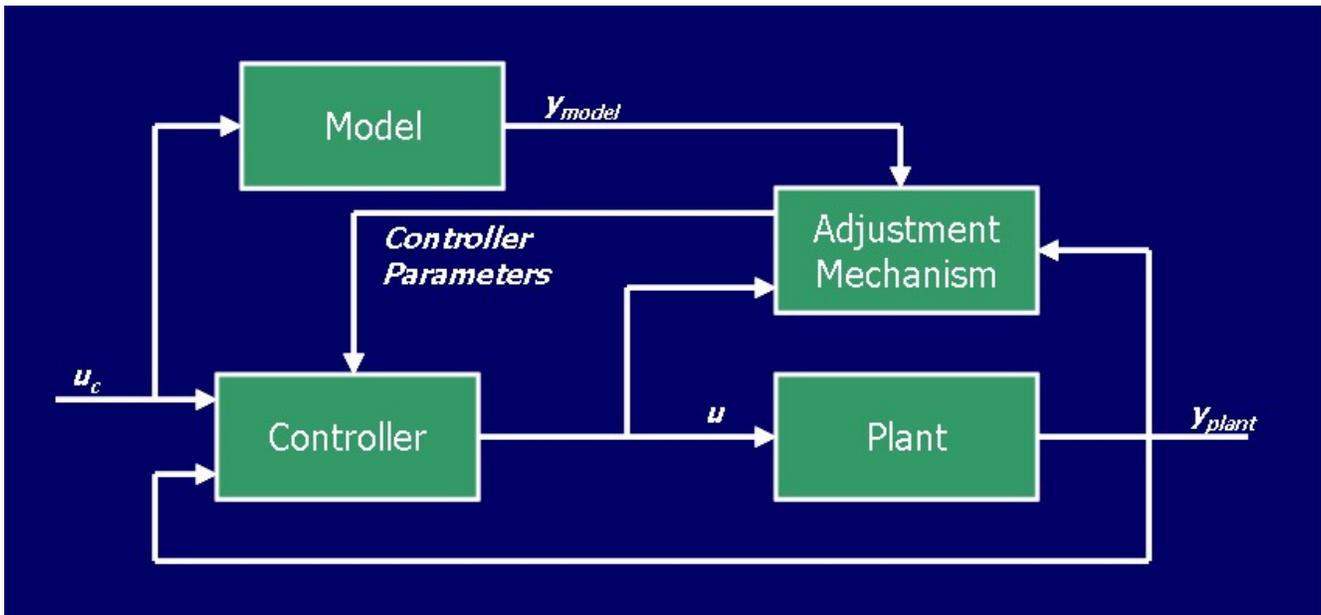# Model Reference Adaptive Control (MRAC)

The general idea behind Model Reference Adaptive Control (MRAC, also know as an MRAS or Model Reference Adaptive System) is to create a closed loop controller with parameters that can be updated to change the response of the system. The output of the system is compared to a desired response from a reference model. The control parameters are update based on this error. The goal is for the parameters to converge to ideal values that cause the plant response to match the response of the reference model. For example, you may be trying to control the position of a robot arm naturally vibrates. You actually want the robot arm to make quick motions with little or no vibration. Using MRAC, you could choose a reference model that could respond quickly to a step input with a short settling time. You could then build a controller that would adapt to make the robot arm move just like the model.

INTRODUCTION

MRAC is a broad subject area with many different applications and methods. The purpose of this tutorial is to introduce the design of an MRAC using the MIT rule. The theory is explained and examples are used to illustrate the concepts. The MIT rule is then applied to control the motion of a pendulum. The remainder of the tutorial demonstrates the simulation and experimental implementation of MRAC on the pendulum system.

Follow the links below:

- **Theory**
- **Simulation**
- **Experiment**
- **Final Words**
- **References**
- **Presentation**
- **Simulink and Labview Code**
  (Written using LabVIEW 7.1 and Matlab 7.0)