RPN TB:

A Tool for Control Performance Improvement

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Key Features:

- Analysis of the process IO-controllability
- Measure of the process nonlinearity degree
- Controller structure analysis tools
- Synthesis of multivariable PID-Controllers
- MIMO- Model Predictive Control Tuning

Industrial Process

Modeling

Operating Points (N)

Modelo

Linearization

$G_1, G_2, .., G_n$

Graphic Interface

RPN Interface

Managing Models

Setting Frequency Interval

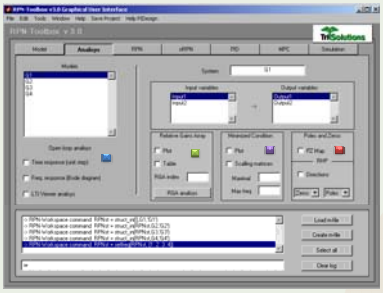
Line Commands

Prompt

Managing Section and Matlab

- Open Loop Analysis
- Relative Gain Array
- Minimized Condition Number
- Poles and Zeros

ANALYZING MODELS



✓What is the dynamic behavior of the model?
✓Is it difficult to control?
✓Which is the appropriated controller structure?

Analyses

Non-Linearity Degree n-RPN ANALYSIS

- Polytope Creation
- n-RPN Indexes
- n-RPN Plots

The nRPN **depends** on:

-Robsust Performance Number
-Variations on Directionality, Gain sign and value

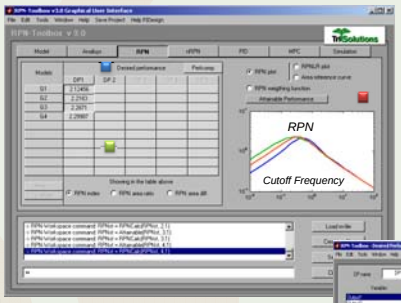
✓Is the Operating Region linear?
✓Can a linear controller be used?

Metrics

0 Linear 1 2 Non-Linear

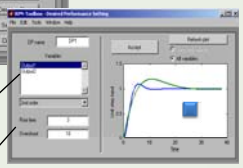
nRPN

RPN ANALYSIS -Performance



The RPN **depends** on:
-Attainable Performance
-Directionality

- Desired Performance
- RPN Indexes
- RPN Plots



Selecting Output

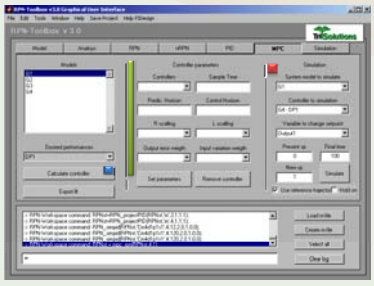
Selecting Order and Parameters

✓How difficult is to obtain the desired performance?

RPN>5: Select new performance or Controller type

3-Design

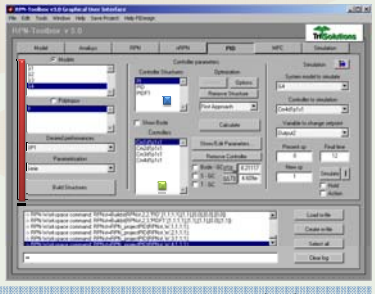
MIMO MPC Tuning



Systematic Tuning

- Calculate
- Controllers/ Param.
- Defining Inputs Controller Performance

Multivariable PID Design



Frequency Response Approximation

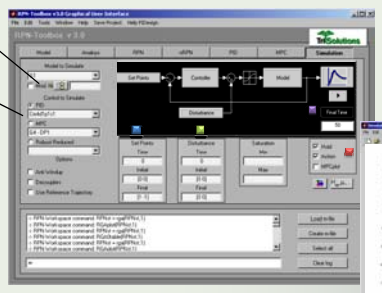
- Structures
- Controllers
- Definition of Inputs Model/Polytope Performance Algorithm Structure

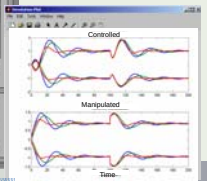
Simulation

Model

Controller

- Set Points
- Disturbance
- Final Time
- Plot Options





✓Which controller is the best?
✓ Is the performance satisfactory?

An effective and time saving tool for designing and evaluating alternative multi-variable control structures

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