



MOTION DYNAMICS TOOL V1.0

List of authors:

J. R. Rivera-Guillen; J. J. Rangel-Magdaleno; R. J. Romero-Troncoso; R. A. Osornio-Rios; R. G. Guevara-Gonzalez.

Thanks for downloading the Motion dynamics development software. This tool allows students to gain expertise in the topic of motion dynamics, allowing the understanding of how the servosystems move through the use of several motion profiles; moreover, through the embedded simulation module students are able to analyze the effects in the servosystem control performance when different motion profiles are utilized. Multi-axis movements are also possible through the use of NURBS-based paths; furthermore, the motion dynamics tool is able to export the generated movements through G06.3 Code for being implemented on a CNC machine.

This tool is developed for supporting the courses of servosystem motion control. It is suitable for the courses of continuous-time control, discrete-time control, CAD/CAM, and robotics. Students desiring to utilize the software should have knowledge in physics, differential equations, splines, mechanical modeling, electricity, electronics and control.

The minimal systems requirements are:

1. Processor running at 1GHz or higher.
2. At least 1GB RAM.
3. Matlab 6.0 or higher

The download includes a folder containing all the required functions for allowing the software working properly. The main function is `profilegui.m` which needs to be executed for starting to use the motion dynamics tool. Preinstalled Matlab software is necessary. In addition, a folder containing several examples of G06.3 code is integrated.

User Guide:

GENERATING THE MOTION DYNAMICS

For launching the motion dynamics tool, please do the following steps:

1. Open Matlab software.
2. Change the current directory to the motiondynamics folder.
3. Write down in the command window profilegui; the application should start, if not please be sure if you correctly select the directory of step 2.
4. Once your program started, you need to choose between 1 Dimension movement or 2 and 3 Dimension movements.
5. If you select 1D movement, choose the desired motion profile for being generated in the popup list from the parameters box
6. Configure the parameters for being considered in the profile generation
7. Push the generate button for generating the motion profile. A plot containing the dynamics of position, speed, acceleration and jerk is shown.
8. If you select 2D and 3D movements, a path is required for starting the motion dynamics generation. In the path box you can choose between generate your own path or to load a G06.3 code. If you desire to generate your own path please push the "NURBS generator" button, and then select with the left button of the mouse the control points of the NURBS, the last control point must be placed with the right button of the mouse.
9. Once a path is loaded to the tool. Push the "GENERATE" button for obtaining the motion dynamics of the path.

SIMULATION OF THE MOTION CONTROLLER PERFORMANCE

Once the motion dynamics of the desired movement is obtained, the Simulation module is enabled; it is accessible through the Simulation icon from the toolbar or by the tools menu. This module allows students to simulate the controller performance on servomotors providing simulations of controller tracking, tracking error and dynamic torque.

1. First, configure the simulation parameters by selecting the axis to be configured from the popup menu.
2. Specify the PID controller parameters.
3. Input a continuous-time model of the servomotor
4. Set the controller sample frequency.
5. Specify the parameters of inertia coefficient (J^*) and the viscous friction (B) of the rotor shaft required for estimating the dynamic torque. CF is a conversion factor relating angular and linear displacement.
6. Push the "Simulate" button for starting the simulation.

For actualizations and more info about the motion dynamics tool please visit

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