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TPO - REGULATOR WITH MASV METHOD

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Abstract: The paper is focused **TPO – regulator** (TPO – Time Pseudo Optimization) with classical MASV (Method Aggregate State Variables) method. Regulator uses dynamical parameters **T, D** and optimization element, which calculates so called better **T, D** in every time t. Regulation will be finished when error vector **e** is small.

Key words: Nonlinear Control, Optimization, Aggregate State Variables.

1 Introduction

Classical formulation of the MASV method does not solve the control in the finite time and construction algorithm uses the control in the infinite time. Time optimization cannot use this formulation. There are not dynamical parameters **T, D**.

In the paper we formulate **TPO - regulator** (TPO – Time Pseudo Optimization) with finite model and dynamical parameters **T, D**.

2 Mathematical model of control system

Let a mathematical model of the nominal nonlinear subsystem be considered

$$\dot{\mathbf{x}} = \mathbf{f}(\mathbf{x},t) + \mathbf{G}(\mathbf{x},t)\,\mathbf{u}\,, \qquad \mathbf{x}(0) = \mathbf{x}_0 \qquad (1)$$

$$\mathbf{x} = [x_1, x_2, \ldots, x_n]^T, \quad \dim \mathbf{x} = n$$
$$\mathbf{u} = [u_1, u_2, \ldots, u_m]^T, \quad \dim \mathbf{u} = m$$

$$\mathbf{f} = [x_2, \ldots, f_{r_1}, x_{r_1+2}, \ldots, f_{r_2}, x_{r_2+2}, \ldots, f_n]^T, \quad \dim \mathbf{f} = n$$

$$\mathbf{G} = \begin{bmatrix} 0 & 0 & \ldots & 0 \\ \ldots & \ldots & \ldots & \ldots \\ g_{r_1 1} & g_{r_1 2} & \ldots & g_{r_1 m} \\ 0 & 0 & \ldots & 0 \\ \ldots & \ldots & \ldots & \ldots \\ g_{r_2 1} & g_{r_2 2} & \ldots & g_{r_2 m} \\ 0 & 0 & \ldots & 0 \\ \ldots & \ldots & \ldots & \ldots \\ g_{n1} & g_{n2} & \ldots & g_{nm} \end{bmatrix},$$

$$\dim \mathbf{G} = (n, m)\,,$$

$$r_j = r_{j-1} + n_j, \; r_0 = 0; \; j = 1,2,\ldots,m$$

$$n = r_m = \sum_{j=1}^{m} n_j$$