

Несмотря на то, что на обоих графиках, представленных на рисунке, корреляционный пик отчётливо различим, заметно, что на правом графике уровень шумов существенно ниже, что свидетельствует об увеличении эффективности частотно-временного корреляционного метода.

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ROBOTIC ARM'S EXECUTIVE SYSTEM PARAMETERS DEFINING DURING FORCED MOTION

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Аннотация – Показано решение задачи идентификации параметров соединенного с двигателем двухзвенного робототехнического манипулятора, для чего использовались относительные углы поворота звеньев и значение движущего момента на оси.

The problem of the two linked robotic manipulator's [1] executive subsystem parameters determining is much complicated by second link's impact to the motions' law. But the solutions like [2] are quite difficult, so there is a need to find simpler ways of solving this task.

During the forced motion, the manipulator's operator-block diagram was converted to the form shown in fig. 1. It was obtained from the standard block diagram of robot's electromechanical executive subsystem [3]:

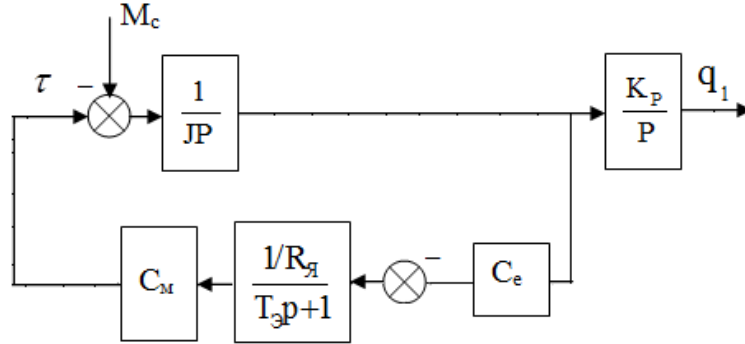


Fig. 1. Executive system's scheme from input τ and output q_1 :

τ – the motor's torque, q_1 – relative first link's angle, R_a – the armature resistance, T_3 – electromagnetic constant; c_e , c_m – constructive motor's parameters; J – inertia moment on a motor's axle; k_p – gear's transfer coefficient; M_c – modulus of resistance

The τ signal is considered as input signal for fig. 1 system and q_1 , q_2 (relative second link's angle) are two output signals (fig. 2).

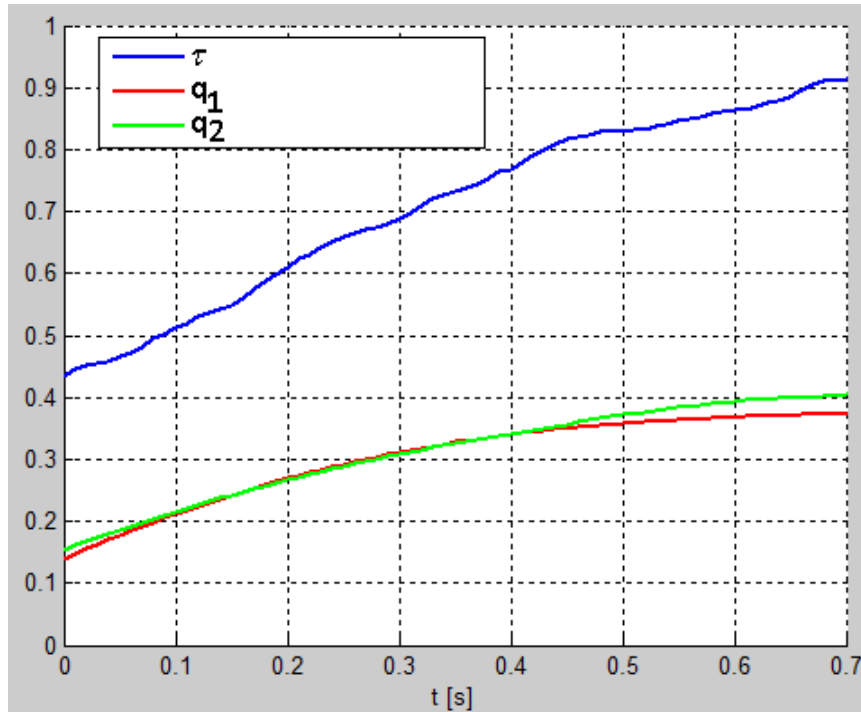


Fig. 2. Input and output signals

During the forced motion the gravitation moment M_c also influences [4]. The angular motion's resulting equation can be shown in form of $q_1 = W_{\theta\tau}(p)\tau + W_{\theta M_c}(p)M_c$.

During the forced motion an identification is implemented using $W(p)|_{p=0}$ [5], and then the $\frac{K_p}{p}$ multiplier can be used as K_p , because the total gravitation moment M_c has greater impact on the motion's law (fig. 2).

Then the transfer functions change to coefficients: $W_{\theta\tau}(p) = \frac{R_{\theta}K_p}{C_e C_M}$,

$W_{\theta M_c}(p) = -\frac{R_{\theta}K_p}{C_e C_M}$, so $q_1 = \frac{R_{\theta}K_p}{C_e C_M}\tau - \frac{R_{\theta}K_p}{C_e C_M}M_c$. However, the work [4] says,

that M_c can be shown in form of $M_c = k_2 \cdot \sin(q_1) + k_3 \cdot \sin(q_2)$, so

$$q_1 = \frac{R_{\theta}K_p}{C_e C_M}\tau - \frac{R_{\theta}K_p}{C_e C_M} \cdot k_2 \cdot \sin(q_1) - \frac{R_{\theta}K_p}{C_e C_M} \cdot k_3 \cdot \sin(q_2).$$

And solving this task using the method of least, we get a model: $q_1 = 3.8477 \cdot 10^{-4}\tau - 0.9379 \cdot \sin(q_1) - 0.0776 \cdot \sin(q_2)$, which has the absolute error $\Delta(t) = |q_{1m}(t) - q_1(t)|$ as in fig. 3.

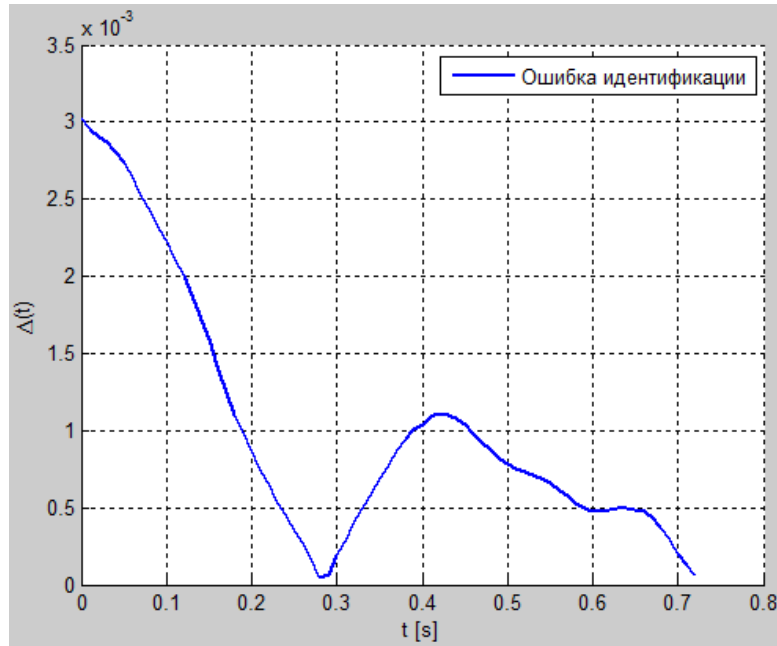


Fig. 3. Identification error in form of absolute error

As a conclusion, the model is computed. So, the next step is to develop control system, which can make manipulator's links move the fixed trajectory. It can be done by adding PID-regulators to the fig. 1 circuit.

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GUI MOBILE DEVICE – IDENTIFIER OF CONTROL OBJECTS

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Abstract – The authors consider creation of convenient and functional graphical user interface for the identifier of control objects on the basis programmable logic controllers of two types.

Introduction

When you configure automatic control systems, the identification of control objects (OC) is very important. The identification process provides a mathematical model of control objects that in the future will provide the coefficients for the accurating configuration of regulators. In this connection was established mobile device management object identifier [1, 4]. To ensure fast and convenient use of the identifier must be simple and intuitive human-machine interface. In modern society, the most widely used graphics device to work at work and at home is the touchpad. Thus parts of the cell identifier