

#SIMULINK

MATLAB

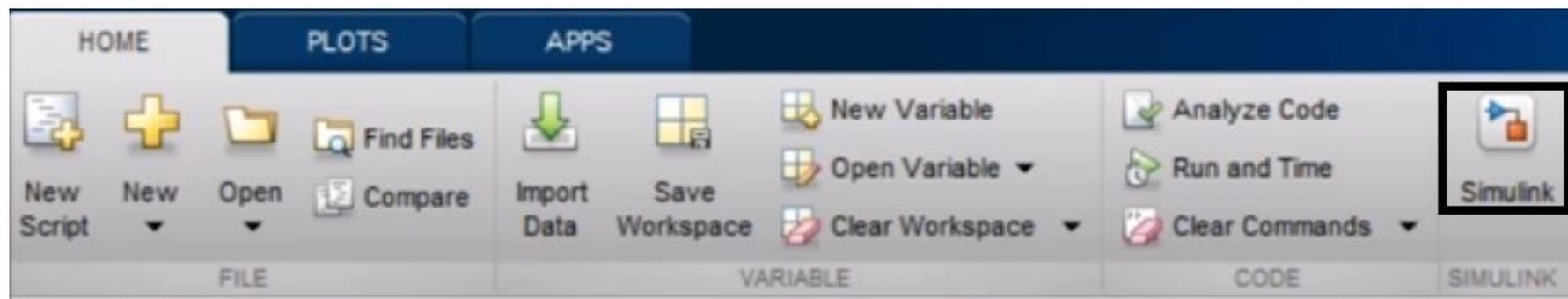
ЛАБОАТОРНАЯ РАБОТА **1**

(МОДЕЛИРОВАНИЕ САУ)

ВВЕДЕНИЕ

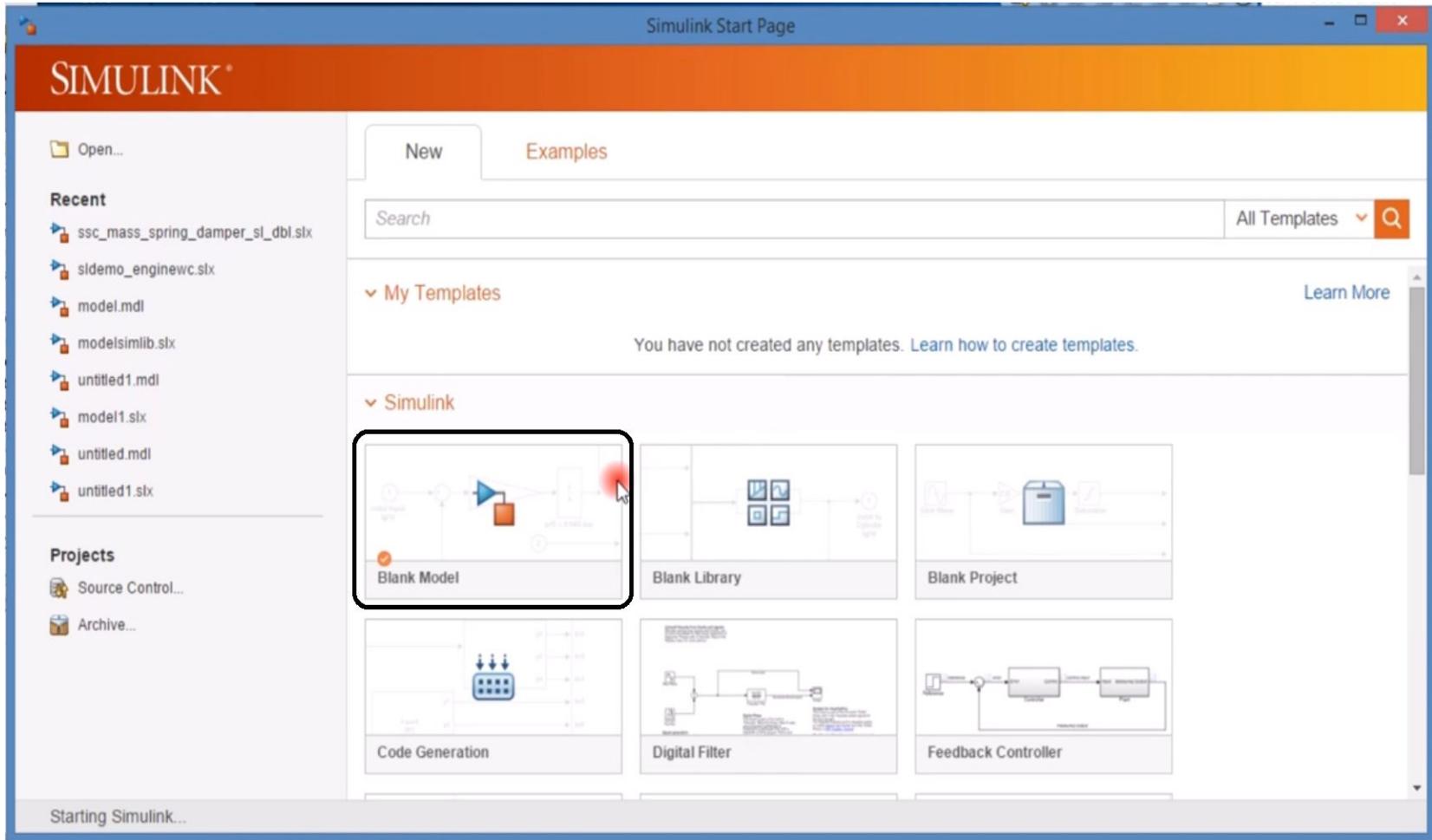
**Элементарная математическая модель в ТАУ является передаточная функция –
Отношение выхода от входа записанное
в операторном виде.**

ЗАПУСТИТЬ **MATLAB**

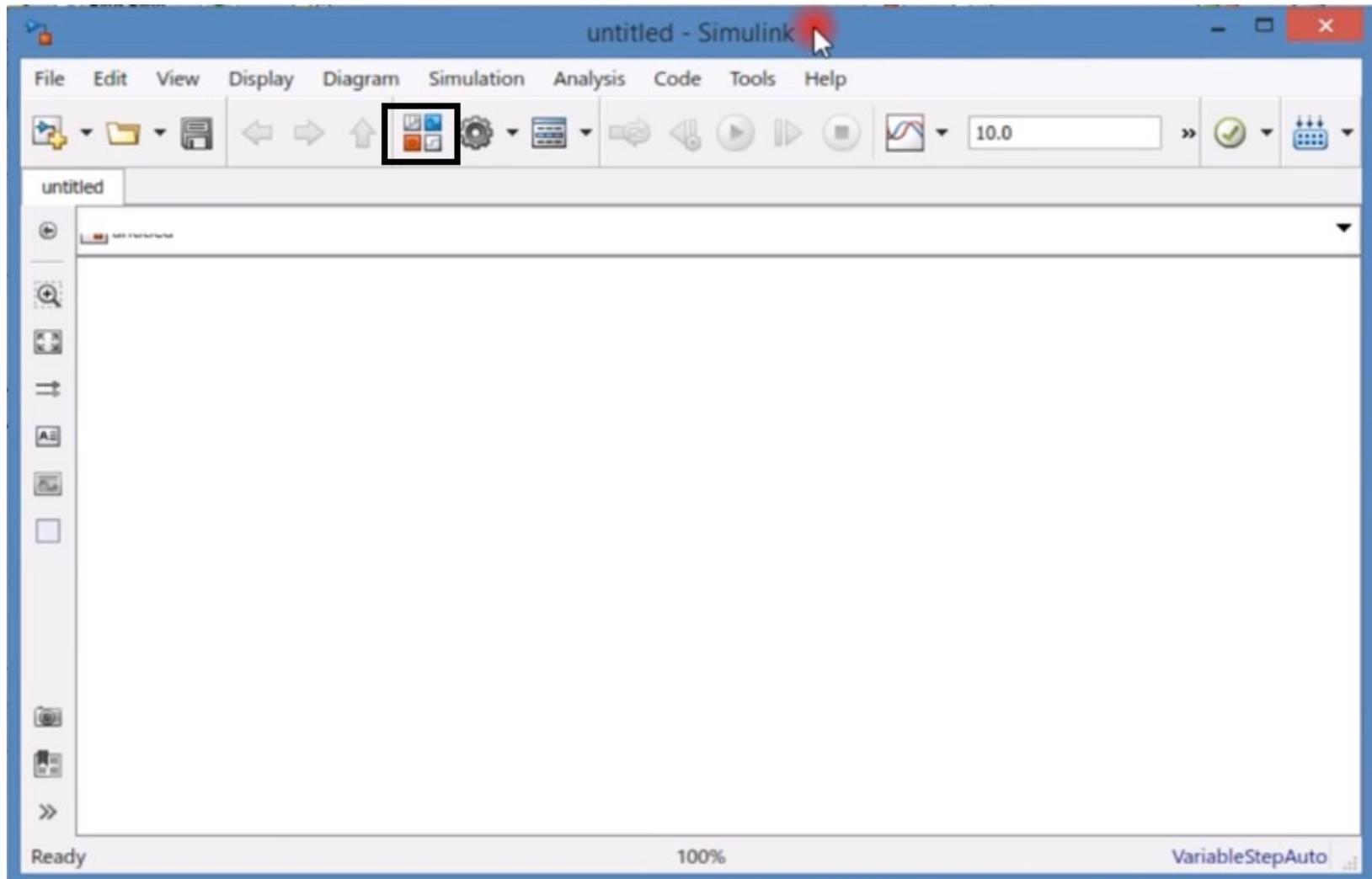


Нажать на иконку “Simulink”

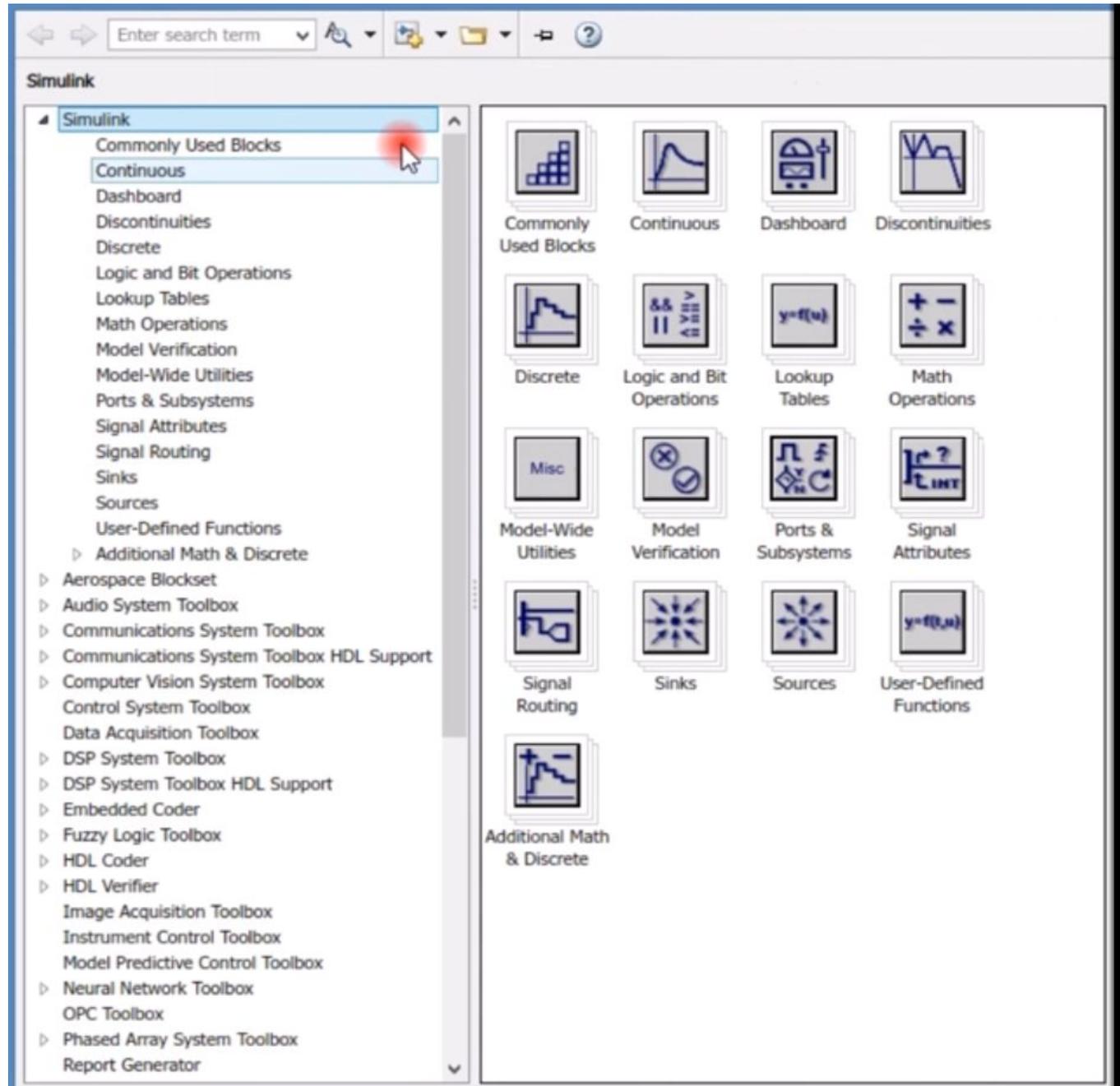
СОЗДАЕМ НОВУЮ МОДЕЛЬ



ОТКРЫВАЕМ БИБЛИОТЕКУ



ВЫБИРАЕМ ЭЛЕМЕНТ



ВЫБИРАЕМ ПЕРЕДАТОЧНУЮ Ф-Ю

The image displays two windows from the MATLAB/Simulink environment. The left window is the 'Simulink Library Browser', showing a tree view of blocks under 'Simulink/Continuous'. The 'Transfer Fcn' block is highlighted with a blue selection box. The right window is the 'untitled - Simulink' workspace, showing a block diagram with a single 'Transfer Fcn' block placed on the canvas. The block's transfer function is $\frac{1}{s+1}$.

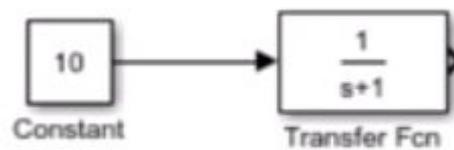
Simulink Library Browser - Simulink/Continuous

- Derivative: $\frac{du}{dt}$
- Integrator: $\frac{1}{s}$
- Integrator, Second-Order: $\frac{1}{s^2} \frac{dx}{dt}$
- Integrator, Second-Order Limited: $\frac{1}{s^2} \int dx$
- Integrator Limited: $\frac{1}{s} \int$
- PID Controller: PID(s)
- PID Controller (2DOF): Ref PID(s)
- State-Space: $\begin{cases} \dot{x} = Ax + Bu \\ y = Cx + Du \end{cases}$
- Transfer Fcn: $\frac{1}{s+1}$
- Transport Delay: $\frac{e^{-sT}}{s}$
- Variable Time Delay: $\frac{e^{-sT(s)}}{s}$
- Variable Transport Delay: $\frac{e^{-sT(s)}}{s}$
- Zero-Pole: $\frac{(s-1)}{s(s+1)}$

Simulink Workspace - untitled - Simulink

Block Diagram: Transfer Fcn ($\frac{1}{s+1}$)

СОЕДИНЯЕМ ЭЛЕМЕНТЫ



ВЫБИРАЕМ ЭЛЕМЕНТ ДЛЯ ИЗ-Я

The image displays the Simulink environment. On the left, the Simulink Library Browser is open, showing a list of blocks under the 'Sinks' category. The 'Scope' block is highlighted with a blue selection box. The main workspace on the right shows a block diagram with three blocks: a Constant block with the value 10, a Transfer Function block with the transfer function $\frac{1}{s+1}$, and a Scope block. A red mouse cursor is pointing at the Scope block in the workspace.

Simulink Library Browser

Simulink/Sinks

- Simulink
 - Commonly Used Blocks
 - Continuous
 - Dashboard
 - Discontinuities
 - Discrete
 - Logic and Bit Operations
 - Lookup Tables
 - Math Operations
 - Model Verification
 - Model-Wide Utilities
 - Ports & Subsystems
 - Signal Attributes
 - Signal Routing
 - Sinks
 - Sources
 - User-Defined Functions
 - Additional Math & Discrete
 - Aerospace Blockset
 - Audio System Toolbox
 - Communications System Toolbox
 - Communications System Toolbox HDL Support
 - Computer Vision System Toolbox
 - Control System Toolbox
 - Data Acquisition Toolbox
 - DSP System Toolbox
 - DSP System Toolbox HDL Support
 - Embedded Coder
 - Fuzzy Logic Toolbox
 - HDL Coder
 - HDL Verifier
 - Image Acquisition Toolbox
 - Instrument Control Toolbox
 - Model Predictive Control Toolbox
 - Neural Network Toolbox
 - OPC Toolbox
 - Phased Array System Toolbox
 - Report Generator

untitled * - Simulink

File Edit View Display Diagram Simulation Analysis Code Tools Help

untitled

untitled

Constant 10

Transfer Fcn $\frac{1}{s+1}$

Scope

ВВОДИМ ПЕРЕДАТОЧНУЮ Ф-Ю

Block Parameters: Transfer Fcn

Transfer Fcn

The numerator coefficient can be a vector or matrix expression. The denominator coefficient must be a vector. The output width equals the number of rows in the numerator coefficient. You should specify the coefficients in descending order of powers of s .

Parameters

Numerator coefficients:

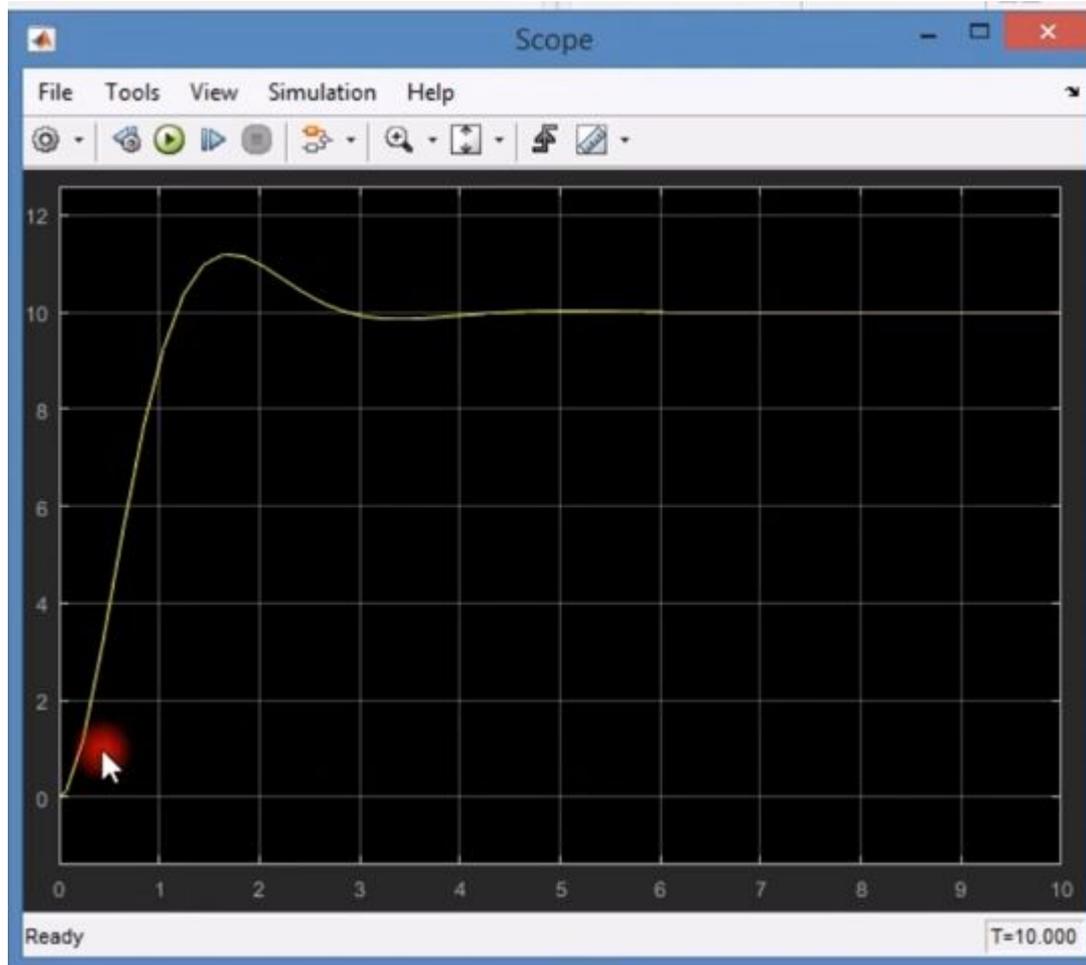
Denominator coefficients:

Absolute tolerance:

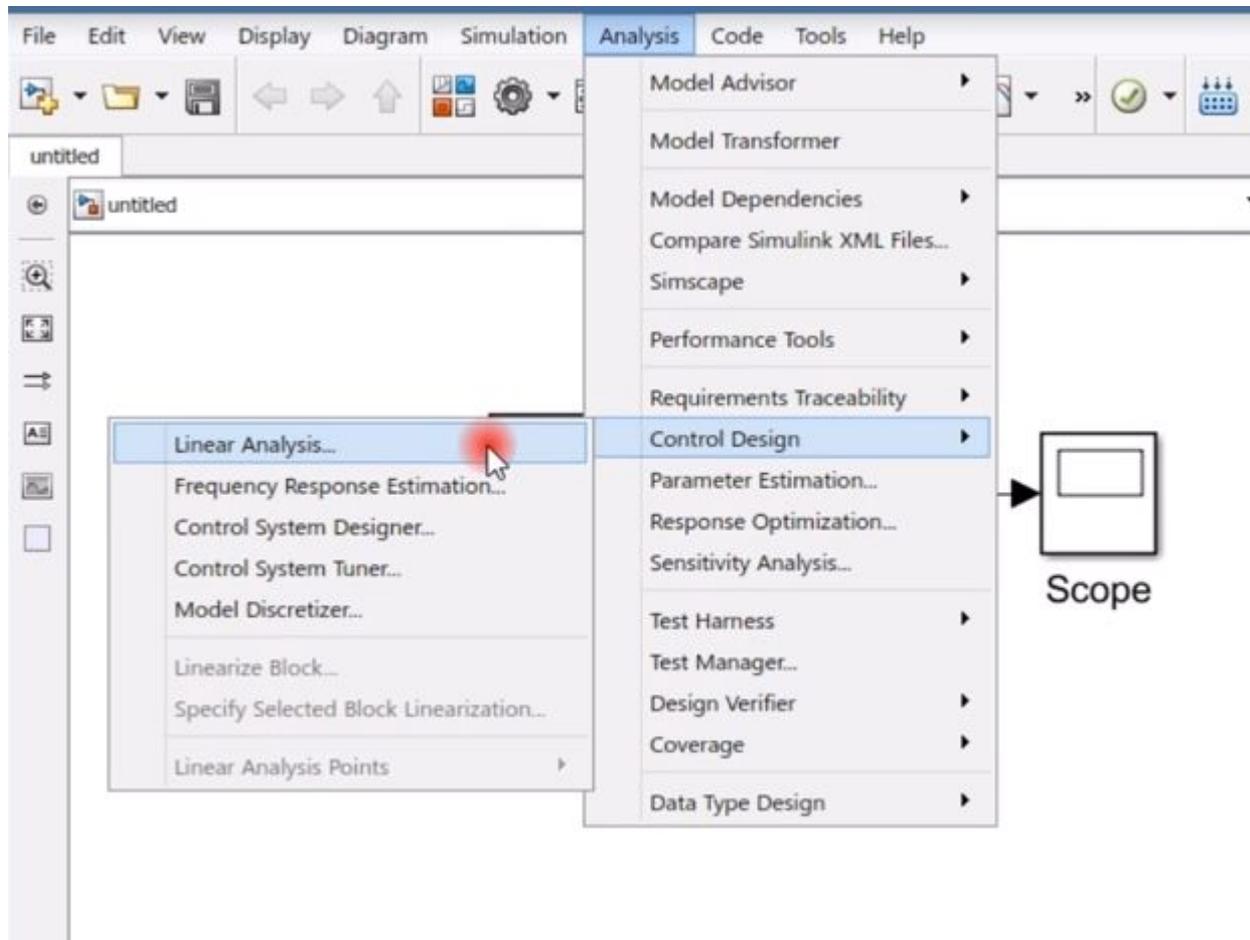
State Name: (e.g., 'position')

OK Cancel Help Apply

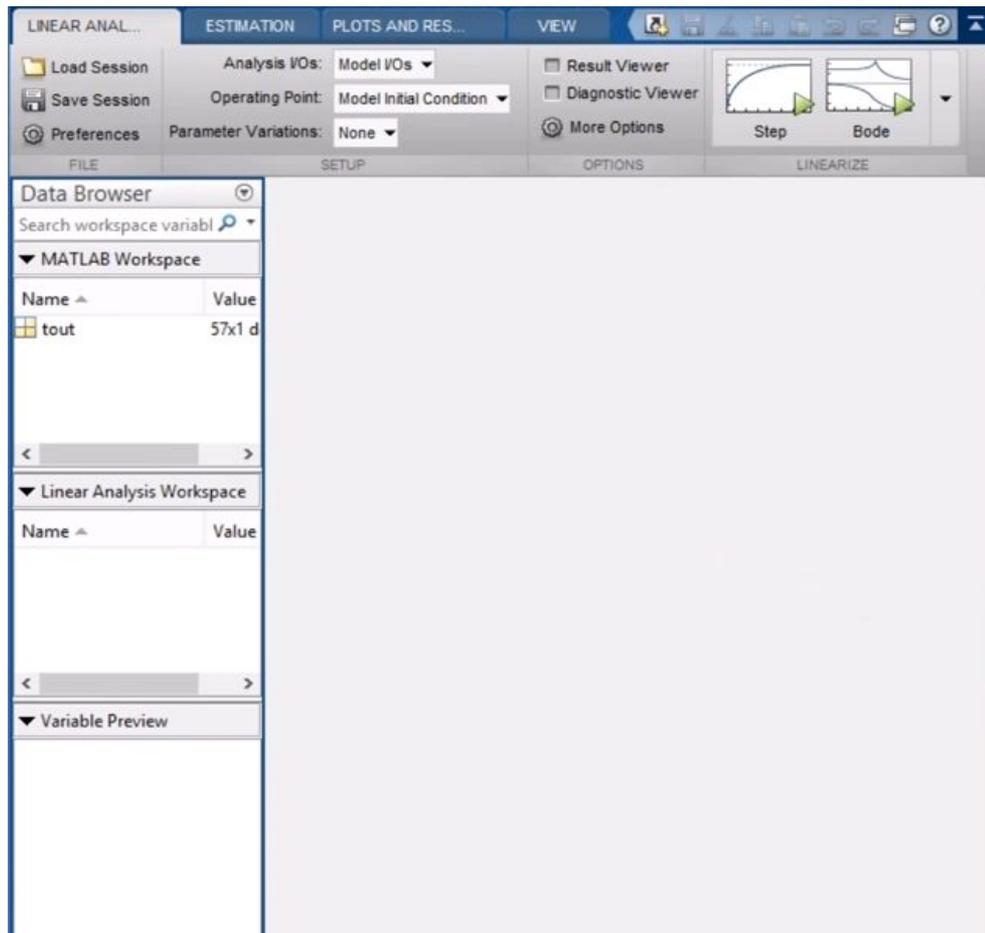
СКАЧКООБРАЗНЫЕ ВРЕМЕННЫЕ ХАРАКТЕРИСТИКИ



СКАЧКООБРАЗНЫЕ ВРЕМЕННЫЕ ХАРАКТЕРИСТИКИ



ЛИНЕЙНЫЙ АНАЛИЗАТОР



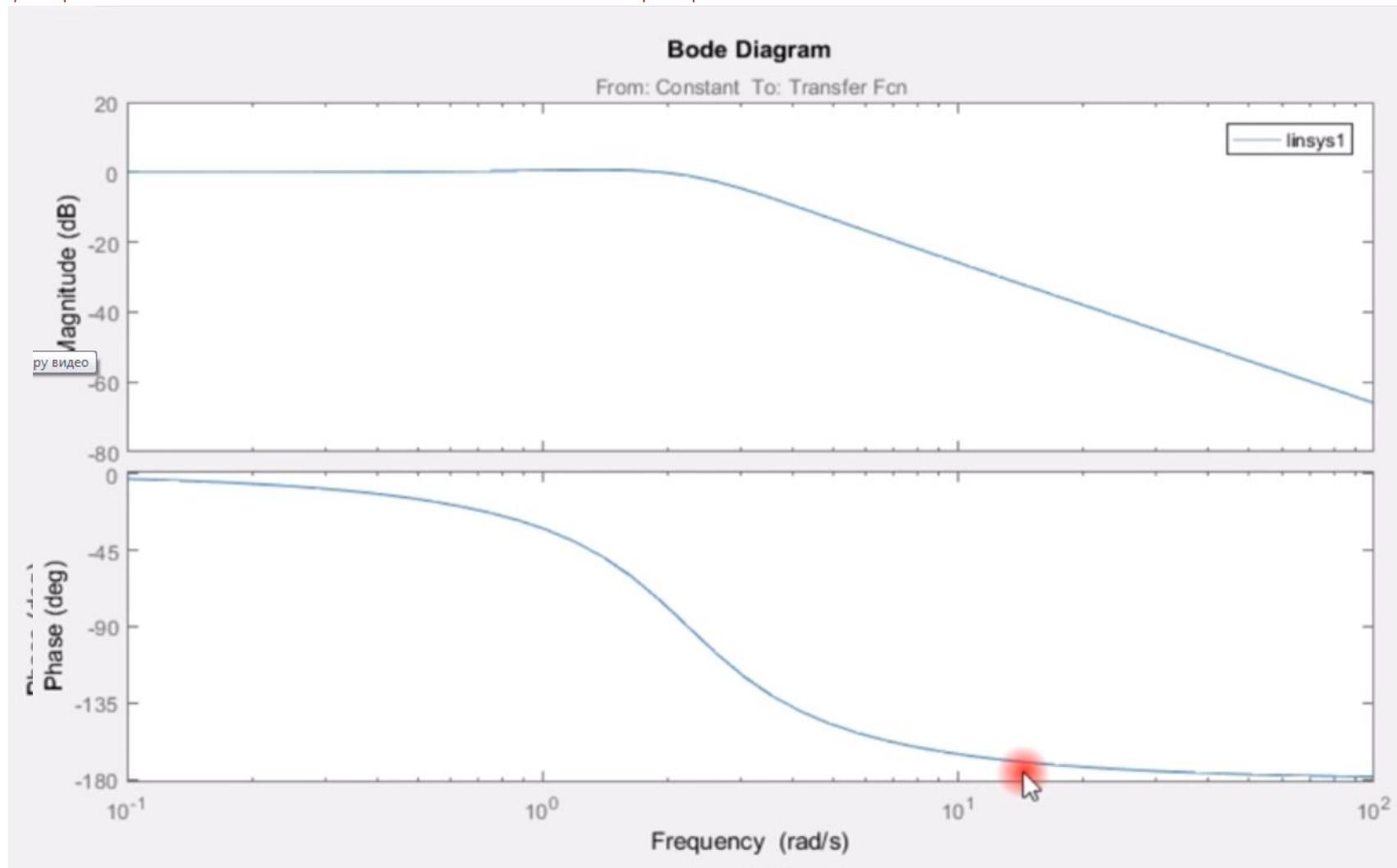
УСТАНОВКА ВХОДА И ВЫХОДА

The image displays two screenshots of a control system software interface, likely MATLAB/Simulink, illustrating the configuration of input and output for a block.

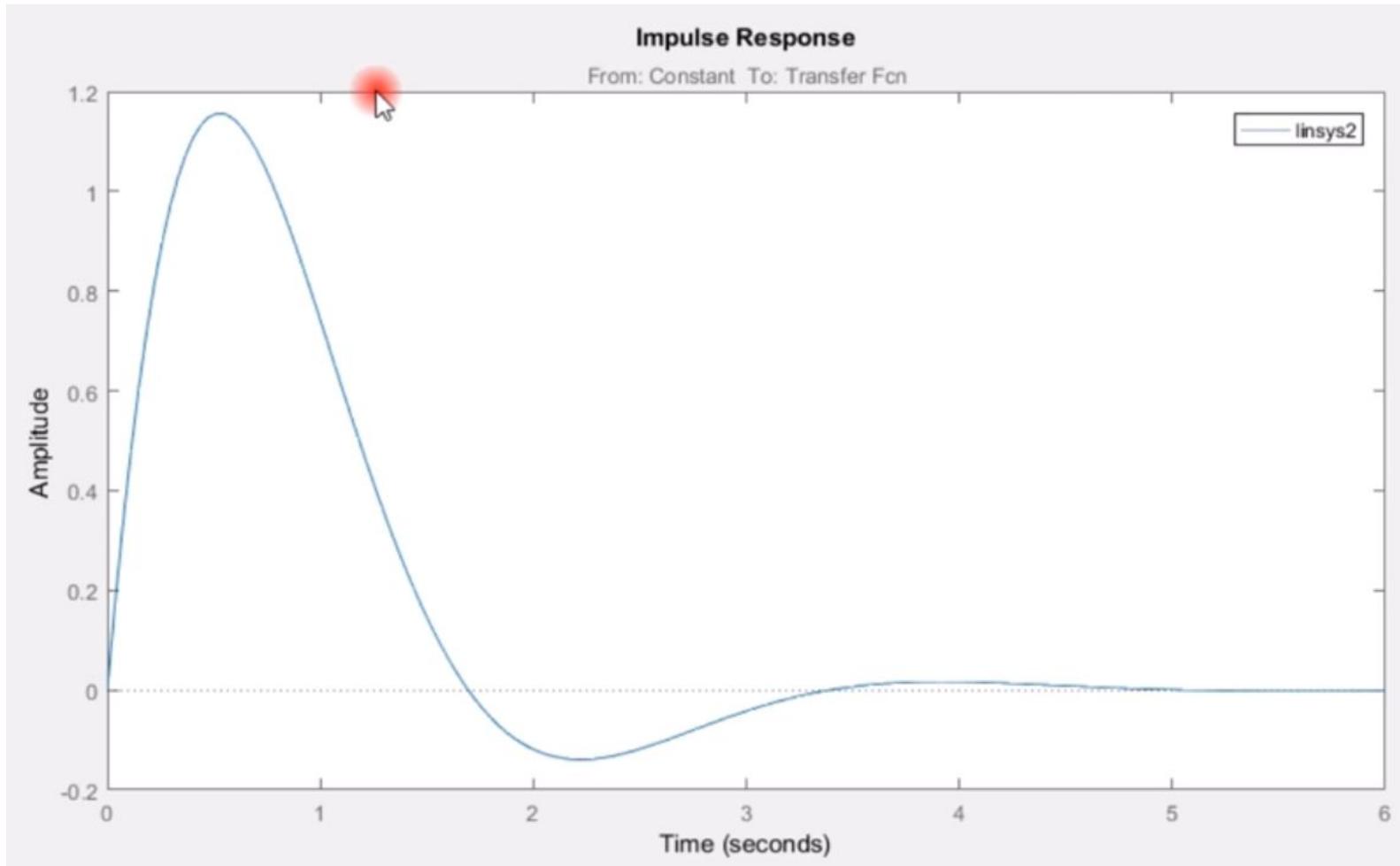
Left Screenshot: Shows a block labeled "Constant" with the value "10" connected to a "Scope" block. The "Signal & Scope Manager" menu is open, and the "Linear Analysis Points" option is selected. A sub-menu is visible, listing various analysis points, with "Input Perturbation" highlighted.

Right Screenshot: Shows a block labeled "Constant" with the value "10" connected to a "Transfer F" block with the transfer function $\frac{1}{0.2s^2+0.5s}$. The "Signal & Scope Manager" menu is open, and the "Linear Analysis Points" option is selected. A sub-menu is visible, listing various analysis points, with "Output Measurement" highlighted.

ДИАГРАММА БОДЕ



ИМПУЛЬСНАЯ ХАРАКТЕРИСТИКА



ЗАДАНИЕ

1. Использовать указанные инструменты моделирования для построения Вашей АСУ;
2. Построить и проанализировать зависимости ЛАЧХ, ФЧХ;
3. Построить и проанализировать импульсную характеристику;
4. Оформить работу согласно требованиям.