IWS$_4$

Topic: ***Research of the systems on stability by the second (direct) method of Lyapunov***

Task Investigate for stability by the second (direct) method of Lyapunov the linearized (linear) ACS which description is set in the state-space (lower by variants);

Lyapunov's function is set the following look:

$$V(x) = \frac{1}{2}(x_1^2 + x_2^2).$$

Define conditions asymptotically of the steady movement of a system on Lyapunov; give geometrical interpretation.

Variants:

1)
$$\begin{cases} \dot{x}_1 = 4x_1 - 6x_2 \\ \dot{x}_2 = 3x_1 + x_2 \end{cases}.$$

2)
$$\begin{cases} \dot{x}_1 = 5x_1 - 5x_2 \\ \dot{x}_2 = 7x_1 + 8x_2 \end{cases}.$$

3)
$$\begin{cases} \dot{x}_1 = 2x_1 + 5x_2 \\ \dot{x}_2 = -10x_1 + 5x_2 \end{cases}.$$

4)
$$\begin{cases} \dot{x}_1 = 4x_1 - 3x_2 \\ \dot{x}_2 = -3x_1 + 4x_2 \end{cases}.$$

5)
$$\begin{cases} \dot{x}_1 = 2x_1 - x_2 \\ \dot{x}_2 = x_1 + 3x_2 \end{cases}.$$

6)

$$\begin{cases} \dot{x}_1 = 10x_1 + 5x_2 \\ \dot{x}_2 = 5x_1 + 7x_2 \end{cases}.$$

7)

$$\begin{cases} \dot{x}_1 = 4x_1 - 3x_2 \\ \dot{x}_2 = 6x_1 + 2x_2 \end{cases}.$$

8)

$$\begin{cases} \dot{x}_1 = 5x_1 - 4x_2 \\ \dot{x}_2 = -8x_1 + 2x_2 \end{cases}.$$

9)

$$\begin{cases} \dot{x}_1 = 2x_1 - 5x_2 \\ \dot{x}_2 = 4x_1 + 9x_2 \end{cases}.$$

10)

$$\begin{cases} \dot{x}_1 = 6x_1 + 2x_2 \\ \dot{x}_2 = -5x_1 + 8x_2 \end{cases}.$$

11)

$$\begin{cases} \dot{x}_1 = 4x_1 - 3x_2 \\ \dot{x}_2 = -5x_1 + 6x_2 \end{cases}.$$

12)

$$\begin{cases} \dot{x}_1 = 7x_1 - 3x_2 \\ \dot{x}_2 = -3x_1 + 5x_2 \end{cases}.$$