Консултације ДЈБ

$$x_1' = 4x_1^2 x_2 - x_1 \cdot \underbrace{E(x_1,x_2)}_{} = 0 \quad / \cdot x_2$$

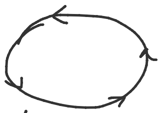
$$x_2' = -2x_1^3 - x_2 \cdot \underbrace{E(x_1,x_2)}_{} = 0 \quad / \cdot (-x_1)$$

$+$

$$E(x_1,x_2) = x_1^2 + 2x_2^2 - 4$$

(t,t) $y'=1$, $x'=1$

(t^3,t^3) $x'=y'=3t^2$



I начин

$x_1 = 2\cos\varphi(t)$

$x_2 = \sqrt{2}\sin\varphi(t)$ ....

II начин $E=0$ $/d$

$$2x_1dx_1 + 4x_2dx_2 = 0 \Rightarrow \frac{dx_1}{dx_2} = -2\frac{x_2}{x_1}$$

$$\frac{dx_1}{dx_2} = \frac{x_1'}{x_2'} = \frac{4x_1^2x_2}{-2x_1^3} = -2\frac{x_2}{x_1}$$

$\uparrow$ $E=0$

a) $4x_1^2x_2^2 + 2x_1^4 = 0$

$x_1^2(4x_2^2 + 2x_1^2) = 0$

$x_1^2 = 0$: $x_1 = 0$, $x_2 = \ldots \pm\sqrt{2} \vee 0$

$4x_2^2 + 2x_1^2 = 0$: $x_1 = x_2 = 0$

стаб. $(0,0)$

I) $L = dF(0,0) \ldots = \begin{bmatrix} \pm 4 & \\ & \pm 4 \end{bmatrix}$

II) $V = x_1^2 + 2x_2^2$

$\uparrow$ $ax_1^2 + bx_2^2$

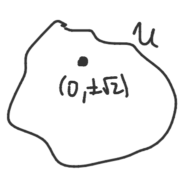
б) $E(x_1,x_2) = V(x_1,x_2)$?

$(0,0)$: $V(0,0) = 0$

$E(0,0) = 0+0-4 = -4 \neq 0$ НЕ

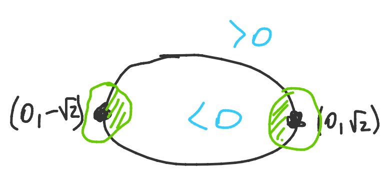
$(0,\pm\sqrt{2})$ $V(0,\pm\sqrt{2}) = 0$

$$V(\varepsilon,\pm\sqrt{2}) = \varepsilon^2 + 4 - 4 = \varepsilon^2 > 0$$



$V\big|_{U\setminus\{x^*\}} > 0$

$$V(0,\pm\sqrt{2}+\varepsilon) = 2(\pm\sqrt{2}+\varepsilon)^2 - 4 = \pm 2\sqrt{2}\,\varepsilon + 2\varepsilon^2 = 2\varepsilon(\varepsilon \pm \sqrt{2})$$



25.08. $x_1' = x_1 \cos x_2 + x_1^2$

$x_2' = x_1$

$$\frac{dx_1}{dx_2} = \frac{\frac{dx_1}{dt}}{\frac{dx_2}{dt}} = \frac{x_1\cos x_2 + x_1^2}{x_1} = \cos x_2 + x_1$$

22.09. $y' = 2(y-2x-3)^{1/2} + 2$, $y(1)=5$

$z = y - 2x - 3$

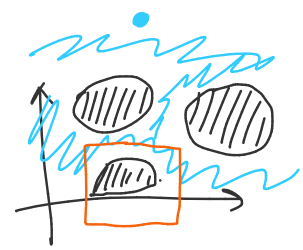
$z' = y' - 2$

$\left.\begin{array}{l} z' = 2z^{1/2} \\ z(1) = 0 \end{array}\right\}$ нуц Лип.

$$\boxed{\begin{array}{l} x_1' = a x_1 + b x_2 \\ x_2' = (a-b) x_1 + b x_2 \end{array}}$$

$V = x_1^2 + x_2^2$

$\langle \nabla V, F \rangle = \ldots$



$(a-\lambda)(b-\lambda) - b(a-b)$

$\lambda^2 - \lambda(a+b) + b^2 = 0$ $\qquad D = (a+b)^2 - 4b^2 = (a-b)(a+3b)$

1° $D<0$ $\qquad \lambda_{1/2} = \frac{a+b \pm i\cdot\sqrt{-D}}{2}$

$Re(\lambda) = \frac{a+b}{2} < 0$ – ст. стар.

$= 0$ – центр

> 0 – неуст.

2° $D=0$

3° $D>0$ ...

$\boxed{\text{Кол 2019.}}$

$x^2 y'' + \ldots = 0 \leftarrow f(x)$

$\boxed{y} = \int G \cdot f(x)$

$$y(1)=0$$
$$y(2)+2y'(2)=0 \qquad \boxed{y\equiv 0}$$

$\boxed{25.03.}$

$\alpha=1$
$\beta=-1$

$$\frac{dx_1}{x_1}-\frac{dx_2}{x_2}-\frac{x_2x_3}{x_1}\cdot dx_3=0 \quad \Big/\cdot\frac{x_1}{x_2}$$

$$\frac{dx_1}{x_2}-\frac{x_1}{x_2^2}dx_2-x_3\,dx_3=0$$

$$(x_1\cos x_2+x_1^2)\frac{\partial u}{\partial x_1}+x_1\frac{\partial u}{\partial x_2}+\left(\frac{x_1}{x_2x_3}\cos x_2+\frac{x_1^2}{x_2x_3}-\frac{x_1^2}{x_2^2x_3}\right)\frac{\partial u}{\partial x_3}=0$$

$$\frac{x_2\,dx_1}{x_2^2}-\frac{x_1\,dx_2}{x_2^2}=\frac{x_2dx_1-x_1dx_2}{x_2^2}=d\left(\frac{x_1}{x_2}\right)=\frac{dx_1\cdot x_2-dx_2\cdot x_1}{x_2^2}$$

$$d\left(\frac{x_1}{x_2}\right)-d\left(\frac{x_3^2}{2}\right)=0 \quad \Big/\int \ldots$$

$$e^{xA}=\begin{bmatrix}\operatorname{ch}x & \operatorname{sh}x\\ \operatorname{sh}x & \operatorname{ch}x\end{bmatrix}=\phi(x)$$

$$\phi'=A\phi \Rightarrow A=\phi'\cdot\phi^{-1}=\ldots$$