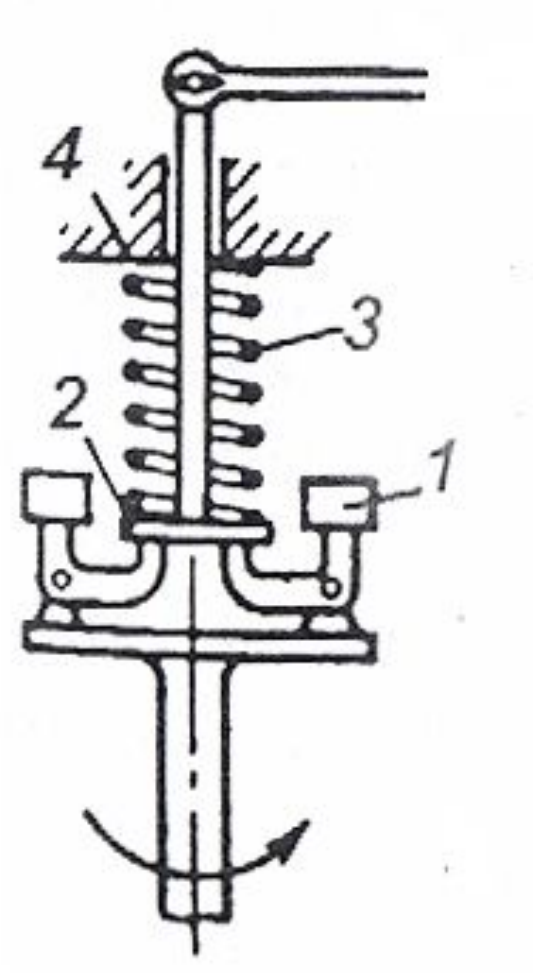
Элементная база регуляторов

(на примере ГТД)

Центробежный маятниковый ЧЭ



входная координата n – обороты ротора,

выходная z – перемещение муфты

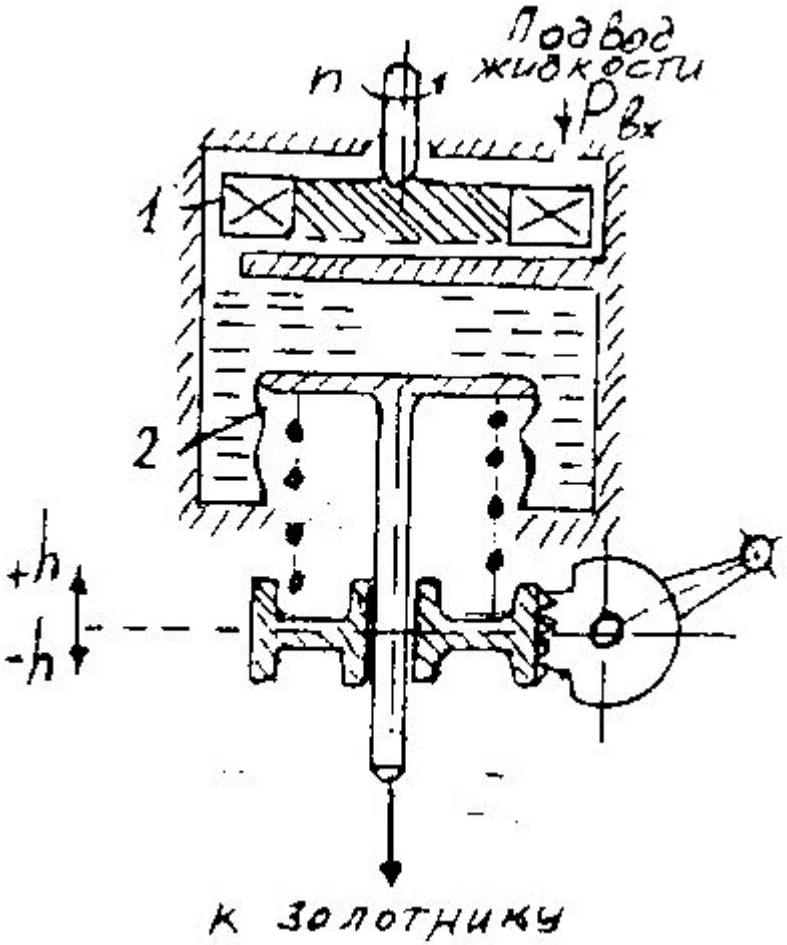
$$W(s) = \frac{k}{T^2 s^2 + Ts + 1}$$

$$k = \frac{2cn^2}{Bz}$$

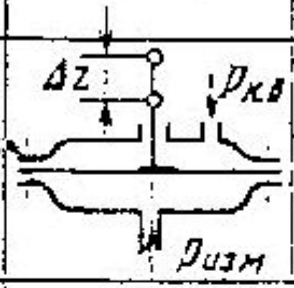
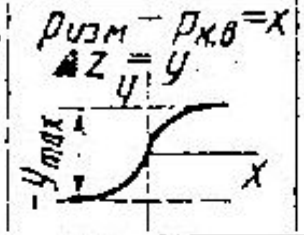
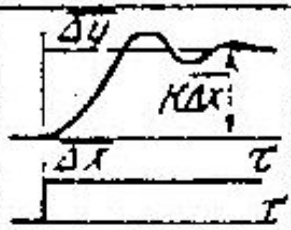
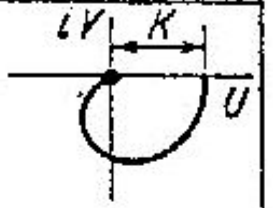
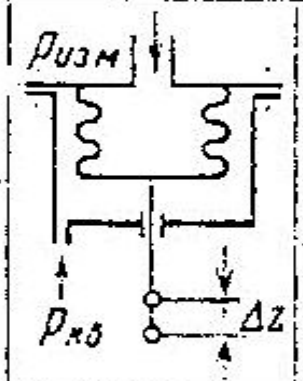
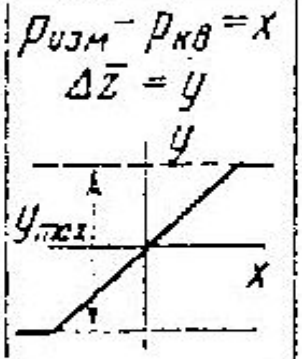
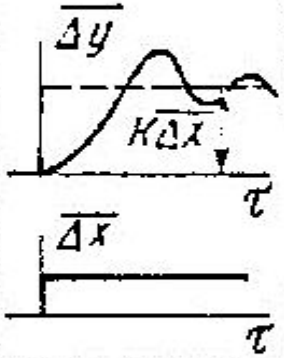
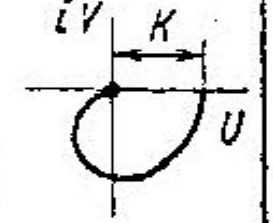
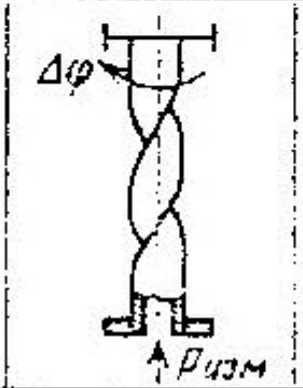
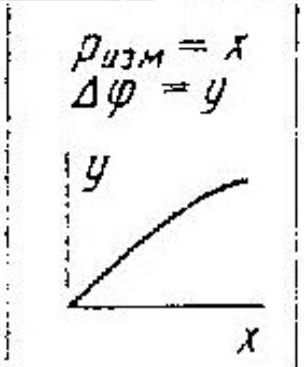
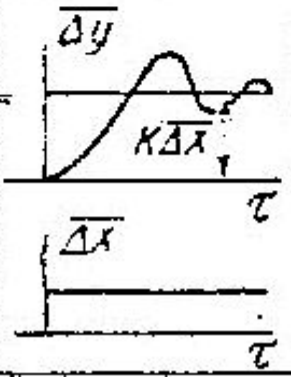
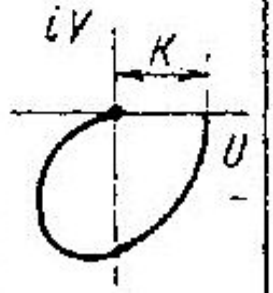
$$T = \frac{\beta}{B}$$

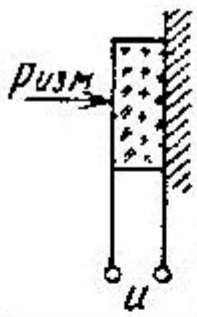
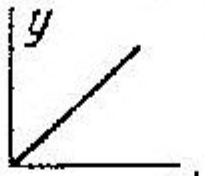
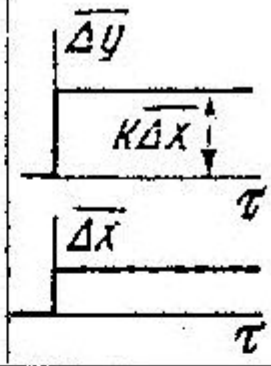
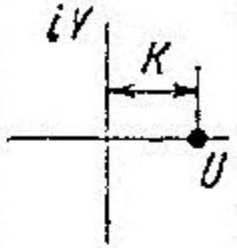
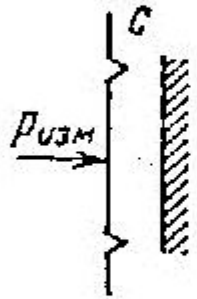
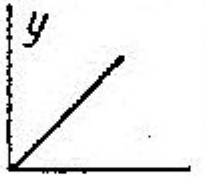
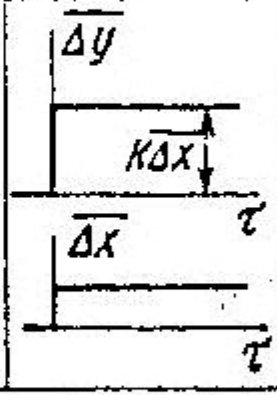
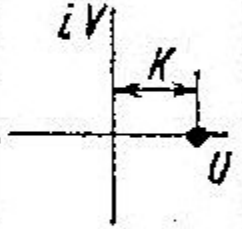
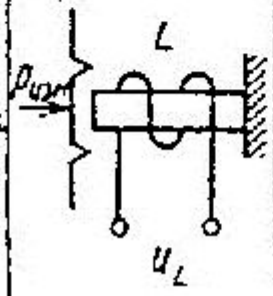
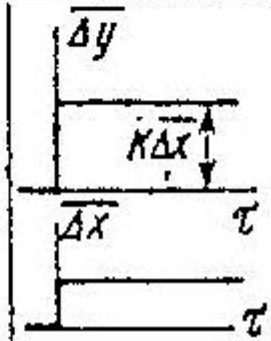
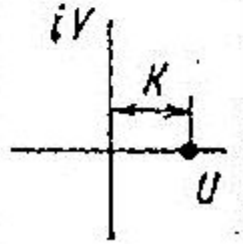
$$T^2 = \frac{\lambda}{B}$$

Гидроцентробежный чувствительный элемент

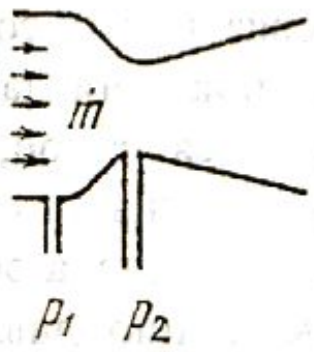
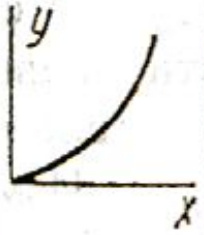
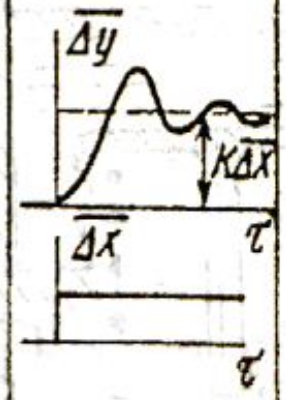
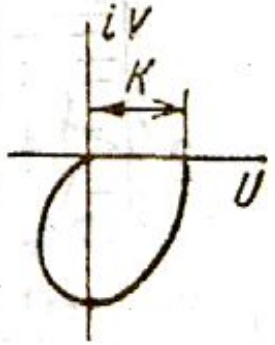
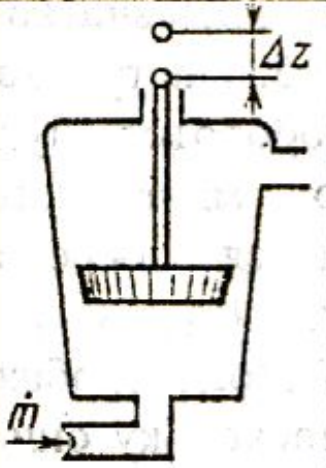
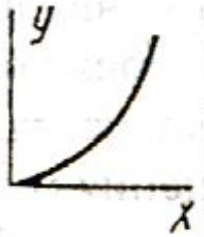
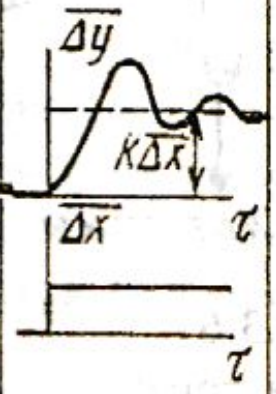
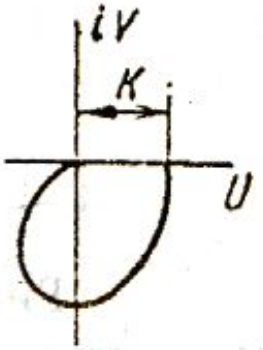


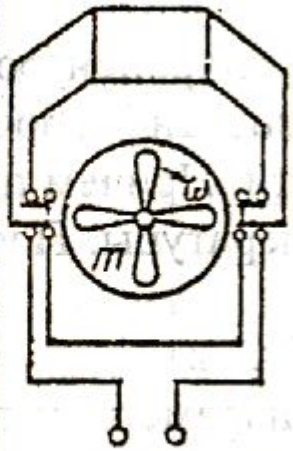
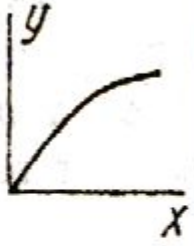
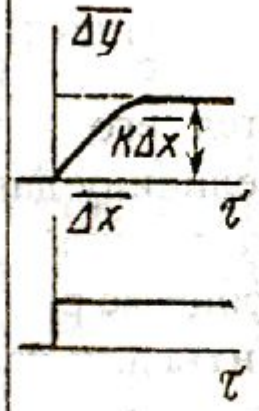
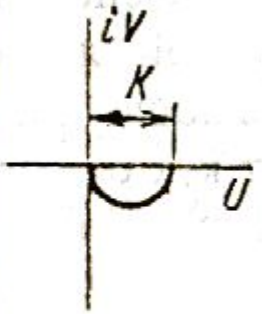
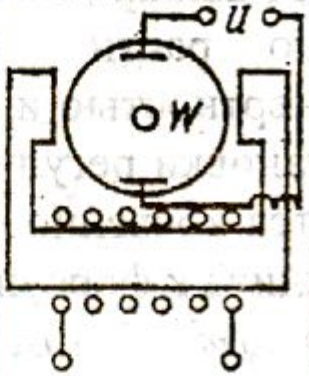
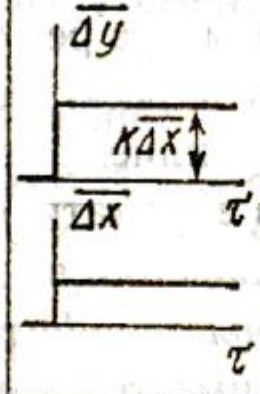
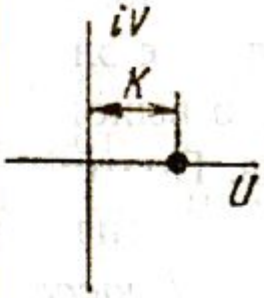
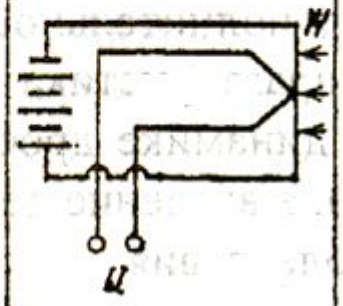
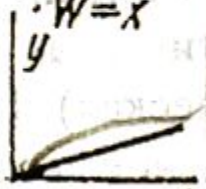
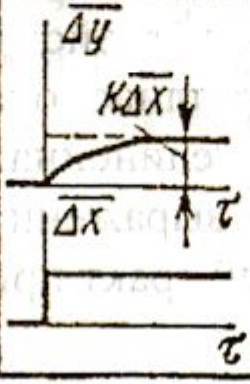
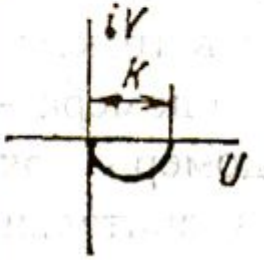
Чувствительные и сравнивающие элементы для измерения давления

№ по пор.	Название	Схема	СХ	Уравнение динамики	Переходный процесс	АФХ
1	Мембранный			$(T_2^2p^2+T_1p+1)\overline{\Delta y}=\overline{\Delta x}$ $T_1<2T_2$		
2	Сильфонный			$(T_2^2p^2+T_1p+1)\overline{\Delta y}=K\overline{\Delta x}$ $T_1<2T_2$		
3	Витая манометрическая трубка			$(T_2^2p^2+T_1p+1)\overline{\Delta y}=K\overline{\Delta x}$ $T_1<2T_2$		

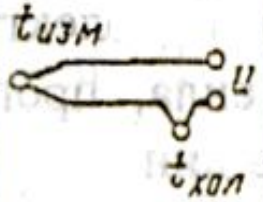
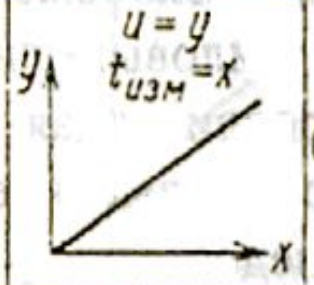
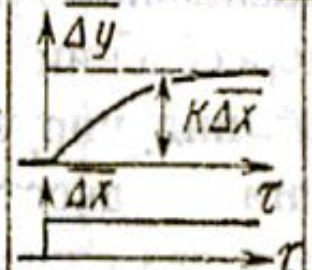
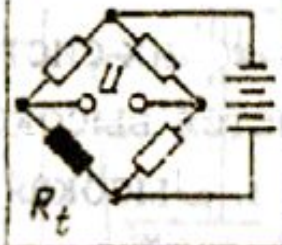
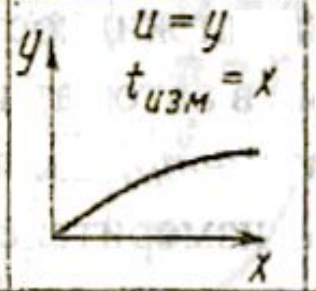
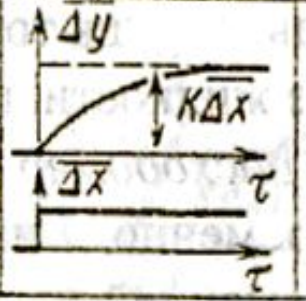
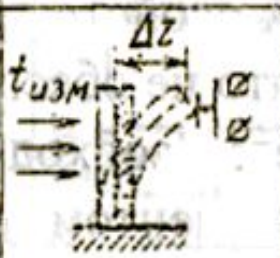
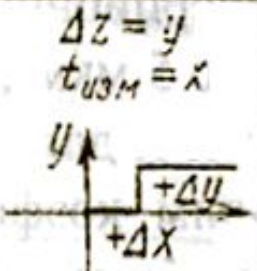
№ по пор.	Название	Схема	СХ	Уравнение динамики	Переходный процесс	АФХ
4	Пьезоэлектрический		$P_{изм} = x$ $u = y$ 	$\overline{\Delta y} = K\overline{\Delta x}$		
5	Емкостной		$P_{изм} = x$ $c = y$ 	$\overline{\Delta y} = K\overline{\Delta x}$		
6	Индуктивный		$P_{изм} = x$ $L = y$ 	$\overline{\Delta y} = K\overline{\Delta x}$		

Чувствительные элементы для измерения расхода

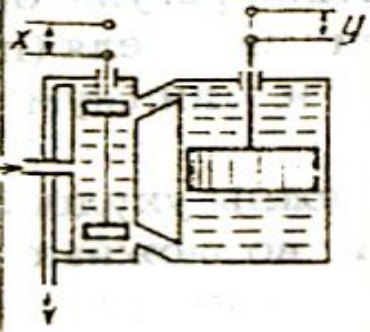
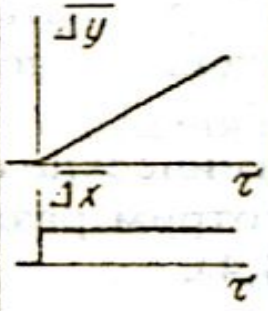
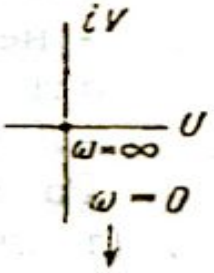
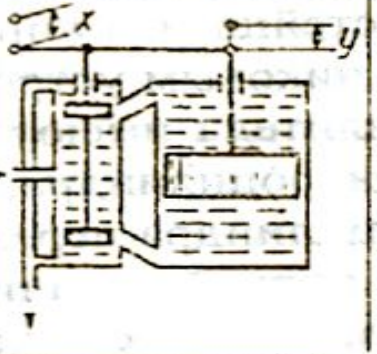
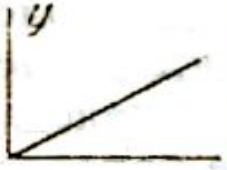
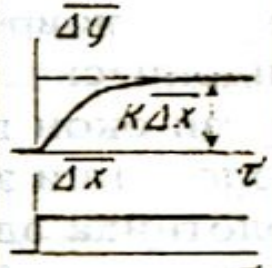
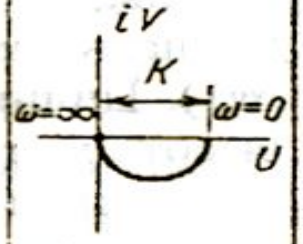
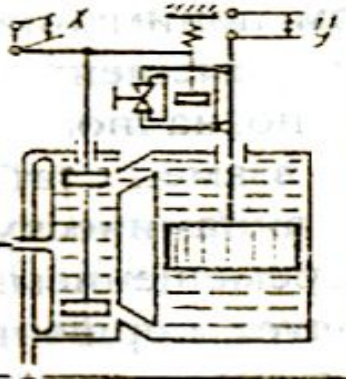
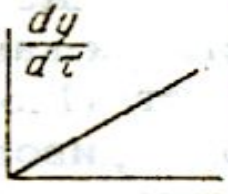
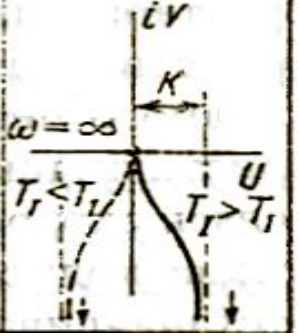
№ по пор.	Название	Схема	СХ	Уравнение динамики	Переходный процесс	АФХ
1	Трубка Вентури		$p_1 - p_2 = y$ $\dot{m} = x$ 	$(T_2^2 p^2 + T_1 p + 1)\overline{\Delta y} = K\overline{\Delta x}$		
2	Ротаметрический		$\Delta z = y$ $m = x$ 	$(T_2^2 p^2 + T_1 p + 1)\overline{\Delta y} = K\overline{\Delta x}$		

3	Турбинный электромагнитный		$\omega = y$ $m = x$ 	$(T_1 p + 1)\overline{\Delta y} = K\overline{\Delta x}$		
4	Электромагнитный индукционный		$u = y$ $W = x$ 	$\overline{\Delta y} = K\overline{\Delta x}$		
5	Тепловой		$u = y$ $W = x$ 	$(T_1 p + 1)\overline{\Delta y} = K\overline{\Delta x}$		

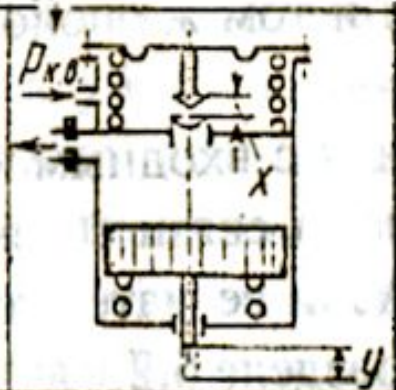
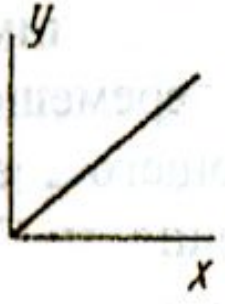
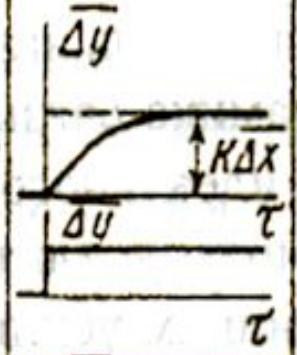
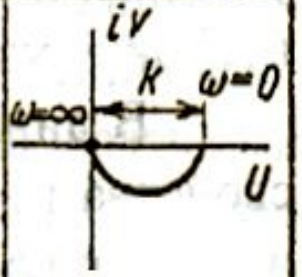
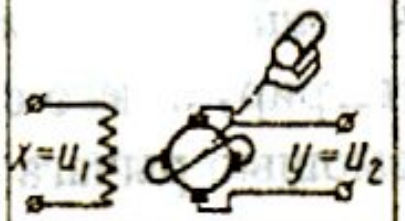
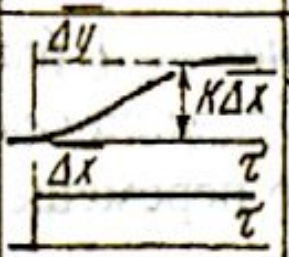
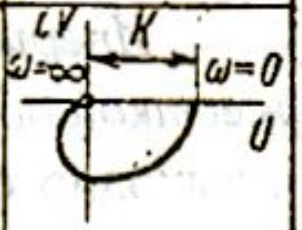
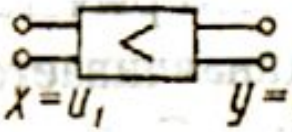
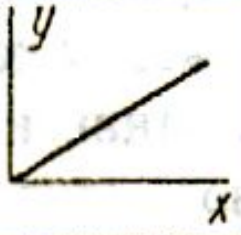
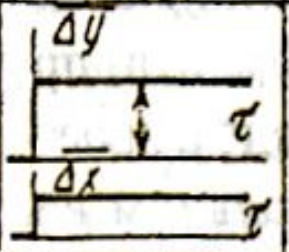
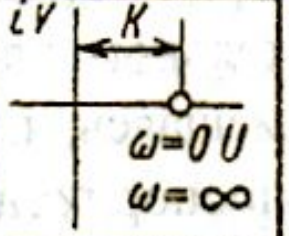
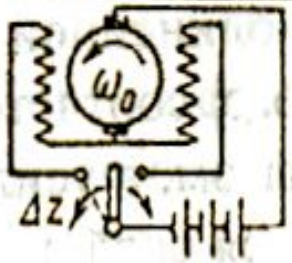
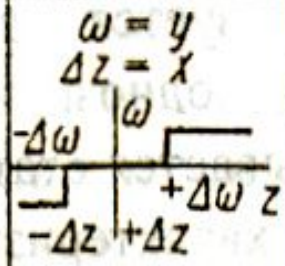
Элементы для измерения температуры

№ по пор.	Название	Схема	СХ	Уравнение динамики	Переходный процесс	АФХ
1	Термопара			$(T_1p+1)\overline{\Delta y}=K\overline{\Delta x}$		
2	Термометр сопротивления			$(T_1p+1)\overline{\Delta y}=K\overline{\Delta x}$		
3	Тепловое реле			$y=0$ при $x<0$ при $x<+\Delta x$ $+\Delta y$ при $x>+\Delta x$		

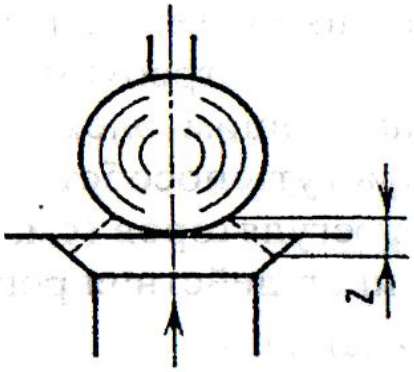
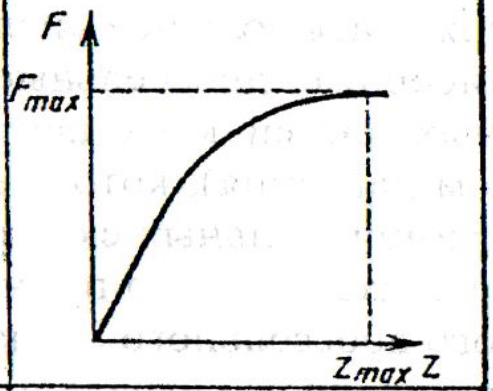
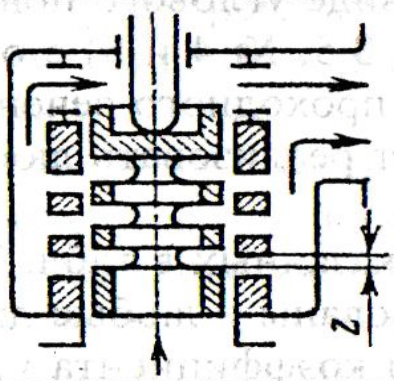
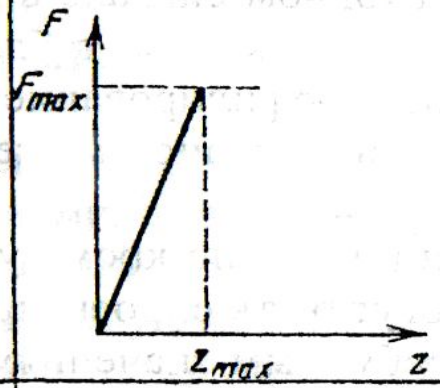
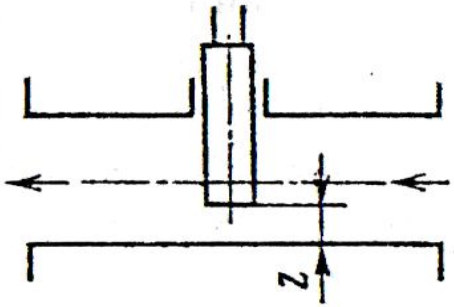
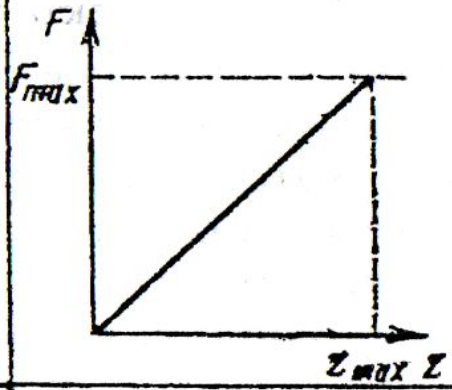
Усилительные элементы

№ по пор.	Название усилителя	Схема	СХ	Уравнение динамики	Переходный процесс	АФХ
1	Поршневой гидравлический (интегрирующий)			$T_y p \Delta\overline{y} = \Delta\overline{x}$		
2	Поршневой гидравлический с жесткой обратной связью (инерционный)			$(T_y p + 1)\Delta\overline{y} = K\Delta\overline{x}$		
3	Поршневой гидравлический с гибкой обратной связью (изодромный)			$(T_2^2 p^2 + T_1 p)\Delta\overline{y} = K(T_1 p + 1)\Delta\overline{x}$		

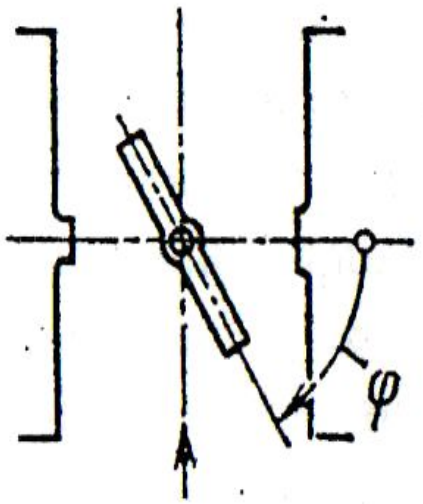
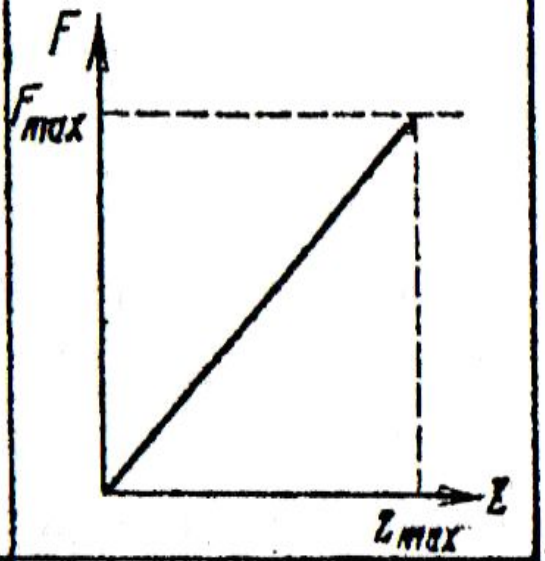
Усилительные элементы

4	Поршневой пневматический			$(T_y p+1)\overline{\Delta y}=K\overline{\Delta x}$		
5	Электромашинный			$(T_2^2 p^2+T_1 p+1)\overline{\Delta y}=K\overline{\Delta x}$		
6	Электронный			$\overline{\Delta y}=K\overline{\Delta x}$		
7	Реверсивный электрический с контактным управлением			$\omega=0$ $\begin{cases}\text{при } x<+\Delta x\\ \text{при } x>-\Delta x\end{cases}$ $+\Delta\omega$ при $x>+\Delta x$ $-\Delta\omega$ при $x<-\Delta x$		

Исполнительные элементы

1	Шаровой		
2	С большим коэффициентом усиления		
3	Шиберный		

Исполнительные элементы

4	Поворотный дроссель		
5	Поворотный секционный дроссель