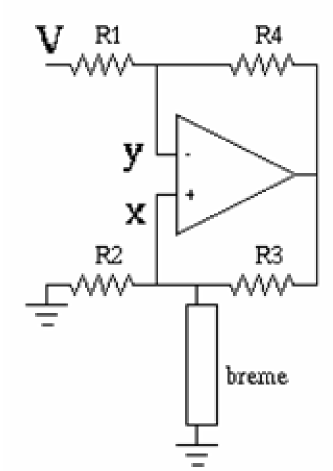
- Tokovni izvor



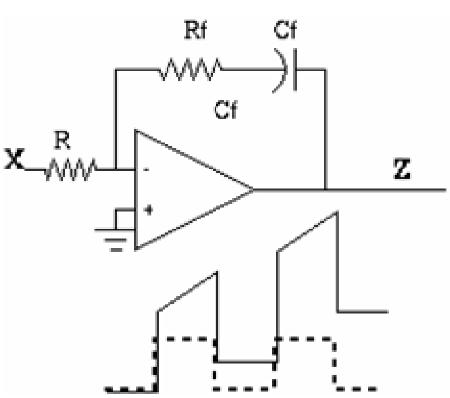
$$A \to \infty, Off = 0, I_{bias} = 0$$
$$\frac{z-x}{R_3} + \frac{-x}{R_L} + \frac{-x}{R_2} = 0$$
$$\frac{z-y}{R_4} + \frac{V-y}{R_1} = 0$$
$$A(x-y) = z$$
$$z - R_3 I_L - x\left[1 + \frac{R_3}{R_2}\right] = 0$$
$$z - x\left[1 + \frac{R_4}{R_1}\right] + \frac{VR_4}{R_1} = 0$$
$$\frac{R_4}{R_1} = \frac{R_3}{R_2}$$
$$z - (z - R_3 I_L) + \frac{VR_4}{R_1} = 0$$
$$R_3 I_L = -\frac{VR_4}{R_1} \quad \Rightarrow \quad I_L = -\frac{V}{R_2}$$

To vezje ne deluje najbolje ker:

- mora biti R2 majhen in hitro dosežemo limito izhodnega toka.
- Pri visokih frekvencah pa pade A.

OPERACIJE Z VEZJI, KI VSEBUJEJO KONDENZATOR

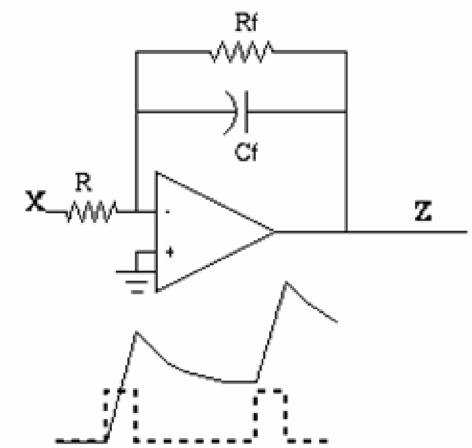
1.) Integrator z ojačevalcem!



$$A \to \infty, Off = 0, I_{bias} = 0$$
$$\frac{x}{R} + \frac{z}{R_f + \frac{1}{C_f p}} = 0, \quad p = \frac{\partial}{\partial t}$$
$$z = -\left[\frac{R_f}{R} + \frac{1}{RC_f p}\right]x = -\frac{R_f}{R}\left[1 + \frac{1}{R_f C_f p}\right]x$$

1.) $R_f \to 0$

2.) $RC_f \to 0$



$$A \to \infty, \; Off = 0, \; I_{bias} = 0$$

$$\frac{x}{R} + \frac{z}{R_f} + \frac{z}{\frac{1}{C_f p}} = 0, \quad p = \frac{\partial}{\partial t}$$

$$z + R_f C_f pz + \frac{R_f}{R} x = 0$$

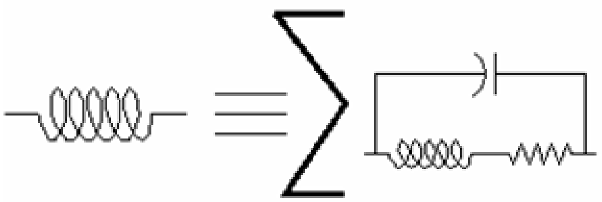
$$(1 + R_f C_f p) z + \frac{R_f}{R} x = 0$$

$$z = -\frac{R_f}{R} \frac{1}{(1 + R_f C_f p)} x$$

1 .) $R_f \to 0$

2 .) $R_f C_f \to 0$

Tuljave!

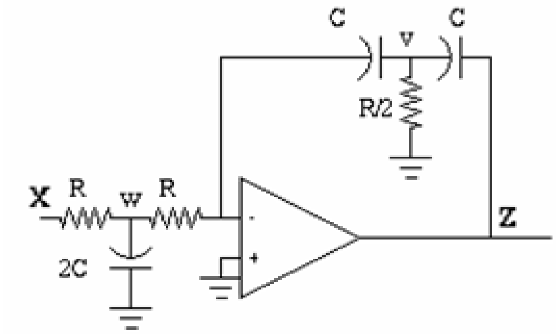


Tuljavam se izogibamo, ker so dejansko bolj komplicirano vezje:

- žice navitja so kapacitativno sklopljene (reda pF/cm)
- žice tuljav predstavljajo omski upor

Pride do nihanj, resonanc, izgub zaradi gretja jedra itd. Izkaže se, da se da v veliko primerih tuljavam ogniti. U=Lp I, se da nadomestiti z povratno zanko in kondenzatorjem.

2.)Dvojni integral lahko realiziramo kot dvojni integrator (glej zgoraj) ali kot sledeče vezje.



Če je vhodna funkcija konstanta je izhod kvadratno naraščujoča napetost. Napišite diffrencialno enačbo, ki vam to zares tudi pove – povezava med diferencialno enačbo in prenosno funkcijo.

$$A \to \infty , Off = 0 , I_{bias} = 0$$

$$\frac{x - w}{R} + \frac{- w}{\frac{1}{2 Cp}} + \frac{- w}{R} = 0$$

$$\frac{z - v}{\frac{1}{Cp}} + \frac{- v}{\frac{R}{2}} + \frac{- v}{\frac{1}{Cp}} = 0$$

$$\frac{w}{R} + \frac{v}{\frac{1}{Cp}} = 0 \to w = - RCpv$$

$$x + 2 RCp (RCp) v + 2 RCpv = 0$$

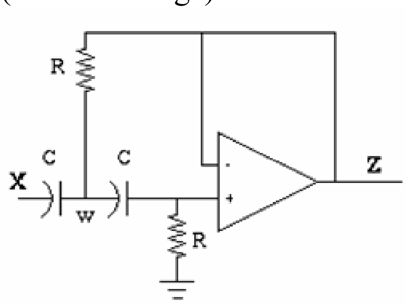
$$Cpz - (2 Cp + \frac{2}{R}) v = 0$$

$$Cpz + \frac{(2 Cp + \frac{2}{R})}{(2 RCp (RCp) + 2 RCp)} = 0$$

$$RCpz + \frac{2 (RCp + 1)}{2 RCp (RCp + 1)} = 0$$

$$z = - \frac{1}{(RCp)^{2}} x$$

3.) Izračunajmo odgovor vezja (domača naloga).



$$Cp (x - w) + \frac{z - w}{R} + Cp (z - w) = 0$$

$$RCp (x - w) + z + RCp (z - w) = 0$$

$$\frac{- z}{R} + Cp (w - z) = 0 \to w = \frac{1 + RCp}{RCp} z$$

$$RCpx + (1 + RCp) z - (2 RCp + 1) w = 0$$

$$RCpx + (1 + RCp) z - \frac{(2 RCp + 1)(1 + RCp)}{RCp} z = 0$$

$$\left[(1 + RCp) - \frac{(2 RCp + 1)(1 + RCp)}{RCp} \right] z = - RCpx$$

$$z = \frac{RCp}{\left[\frac{(2 RCp + 1)(1 + RCp)}{RCp} - (1 + RCp) \right]} x$$