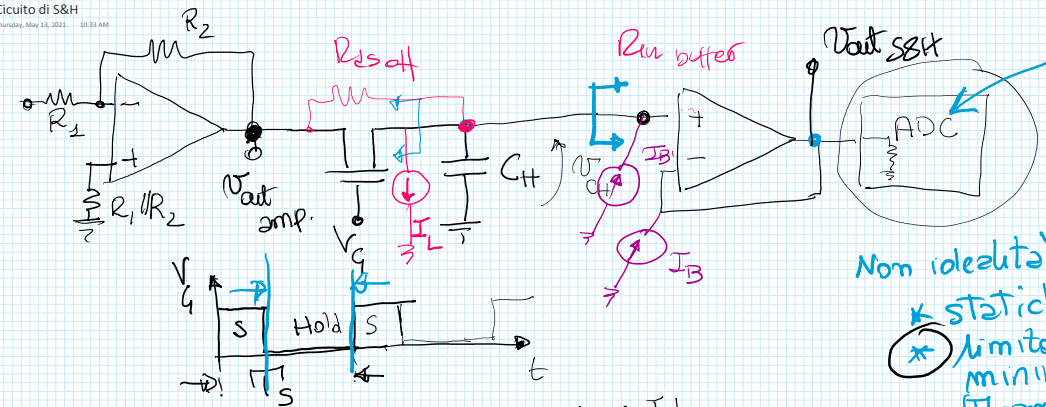
Cicuito di S&H

Thursday, May 13, 2021 10:33 AM



tempo di campionamento Totale

$$f_c = \frac{1}{T_S}$$

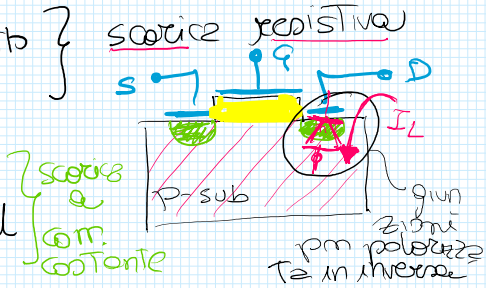
Non idealità

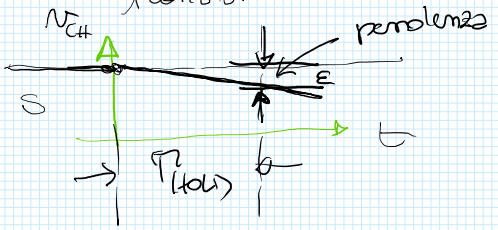
- statiche
  - limitazioni sulla minima durata di T sample ← richiede C_H piccole
  - max. durata T_{HOLD} → C_H grande da preferirsi
  - iniezione di carica

MASSIMA DURATA T_{HOLD}:

- resistenza di off del transistore MOS spento
- resistenza di ingresso del buffer
- corrente di bias opamp
- correnti di buio delle giunzioni pn del transistore

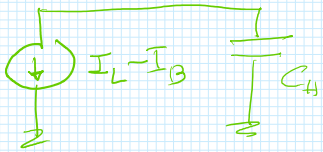
} sorgente resistiva

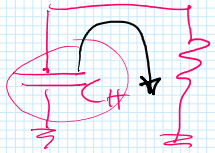




$$\frac{dV_{CH}}{dt} = \frac{I}{C_H} = \frac{-I_B + I_L}{C_H}$$

$$\frac{dV_{CH}}{dt} * T_{HOLD}|_{max} \leq \varepsilon$$



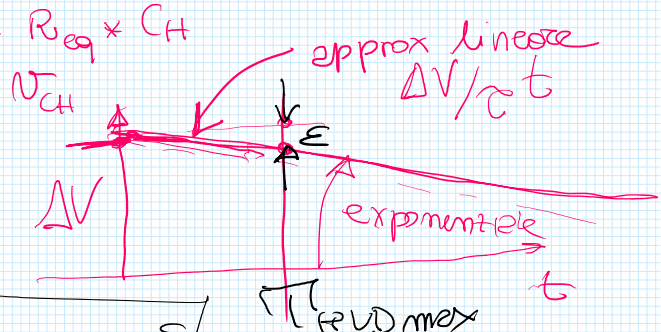


$$R_{eq} = R_{inputter} // R_{ds\,off}$$

$$V_{CH} = \Delta V \exp(-t/\tau)$$

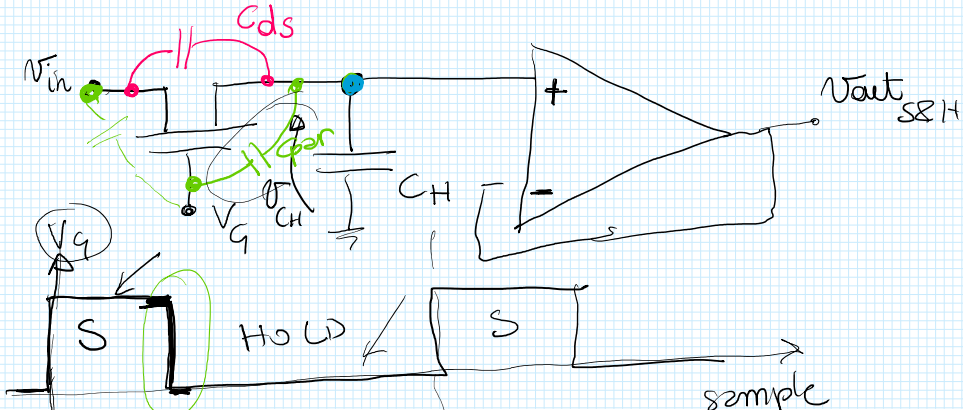
$$\tau \gg T_{HOLD}$$

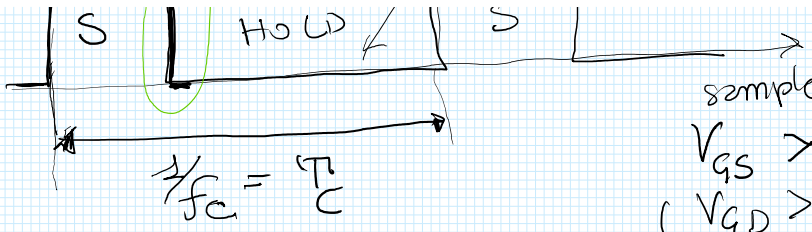
$$\tau = R_{eq} * C_H$$



$$\boxed{\frac{\Delta V}{\tau} T_{HOLD\,max} = \varepsilon}$$

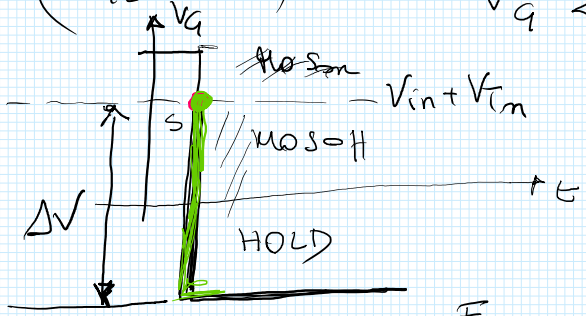
* iniezione di carica



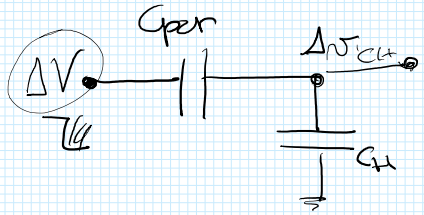


sample
$V_{GS} > V_{Tn}$
$(V_{GD} > V_{Tn})$

Hold
$V_{GS} < V_{Tn}$
$V_G < V_{Tn} + V_S = V_{Tn} + V_{in}$



→ effetto Cpar

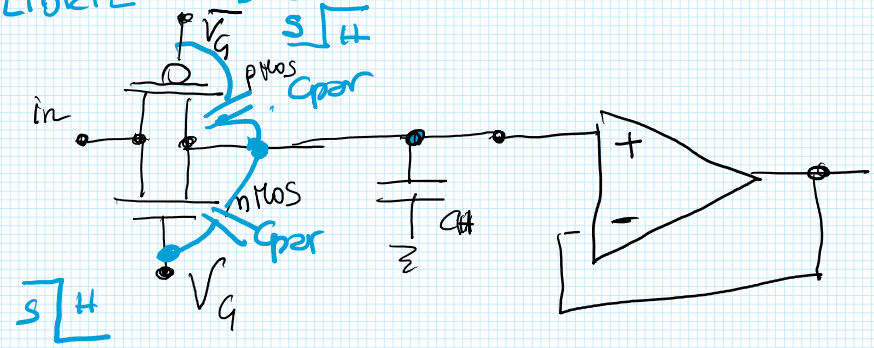


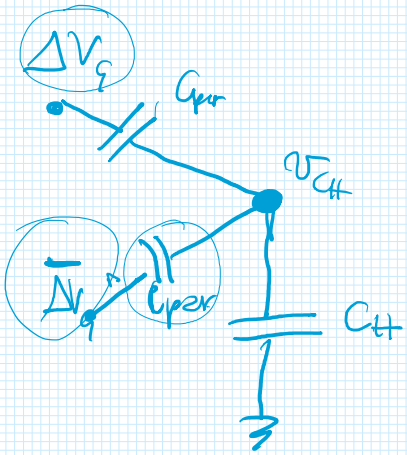
$\Delta V_{CH} = \Delta V \cdot \frac{C_{par}}{C_{par} + C_H}$

$C_H \simeq nF$
$C_{par} \simeq pF$

→ effetto Cds

MIGLIORIE DEL CIRCUITO DI S&H





- fase di HOLD MOS spenti

$$\begin{cases} V_{GS_n} < V_{T_n} \\ V_{GS_p} > V_{T_p} \end{cases}$$

$V_G - V_S < V_{T_n}$ $\quad V_G < V_{T_n} + V_{in_{min}}$

$V_G > V_{T_p} + V_{S_p}$ $\Rightarrow$ $V_G > V_{T_p} + V_{in_{max}}$

$V_{in_{max}}$

- fase di sample MOS on e in zona ohmica

$V_{GS_n} > V_{T_n} \rightarrow V_G > V_{T_n} + V_{in_{max}}$

$V_{GS_p} < V_{T_p} \rightarrow V_G < V_{T_p} + V_{S_p} = V_{T_p} + V_{in_{min}}$.

$$V_{CH} = \Delta V_G \cdot \frac{C_{par}}{C_H + C_{par}} + \Delta V_G \frac{C_{par}}{C_{par} + C_H}$$