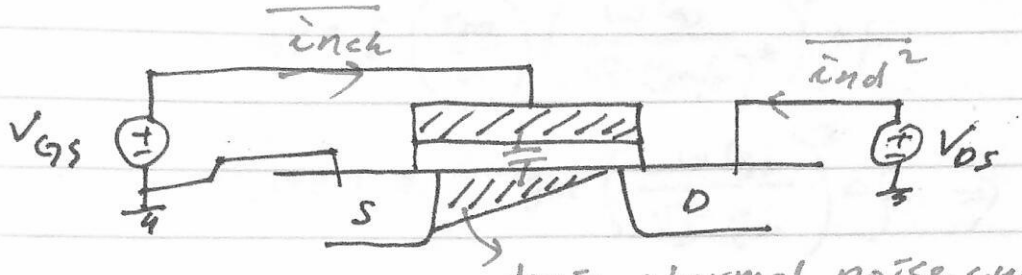
④ Now let's introduce another noise ~~se~~ which is induced gate noise (or induced channel noise).



drain thermal noise current generates noise voltage across channel.
This noise voltage will be coupled capacitively into the gate terminal, causing a gate noise current.

⇒ This is "induced channel noise" (or induced gate noise).

$$\overline{i_{nd}^2} = 4KT\gamma g_{do}\Delta f$$

⇒ effective channel noise voltage

$$\overline{v_{nd}^2} \propto \overline{i_{nd}^2} \times \left(\frac{1}{g_{do}}\right)^2 = \frac{4KT\gamma}{g_{do}}\Delta f$$

⇒ effective induced ~~data~~ gate noise current

$$\overline{i_{n,ch}^2} \propto \overline{v_{nd}^2} \times \omega^2 C_{gs}^2 = 4KT\gamma \frac{\omega^2 C_{gs}^2}{g_{do}}\Delta f$$

$$= 4KT\gamma g_{do}\left(\frac{\omega C_{gs}}{g_{do}}\right)^2 \Delta f$$

⇒ More exact expression
(according to "Van Der Ziel" noise model)

$$\overline{i_{nch}^2} = 4KT\delta g_{do}\left(\frac{\omega C_{gs}}{\sqrt{5}\cdot g_{do}}\right)^2 \Delta f$$

~~δ = gate noise~~ · δ = induced gate noise coefficient.
· typically $\delta = 2\gamma$.