

Topic

MOSFET'S

Governing Equations and Assumptions

Saturation

$$i_D = K (V_{GS} - V_{to})^2 \quad V_{GS} > V_{to}, \quad V_{DS} \geq V_{GS} - V_{to}$$

Circuit Analysis

Source Transformations

Process

① Convert the circuit to an equivalent circuit using source transformations if necessary

② Set $i_G = 0$

③ KVL Left $\Rightarrow V_{GS}$ ^{i_D ?}

④ Apply the saturation Region

$$i_D = K (V_{GS} - V_{to})^2$$

Two equations
two unknowns
 \Rightarrow Two roots
 \Rightarrow Select the
larger root

⑤ KVL Right $\Rightarrow V_{DS}$

⑥ Verify the saturation region

$$V_{GS} \stackrel{?}{>} V_{to}, \quad V_{DS} \stackrel{?}{\geq} V_{GS} - V_{to}$$