PMOS CHARACTERISTICS

OBJECTIVES:

To analyse the I-V Characteristics of PMOS Transistors

TOOLS:

Linux operated computing system, Cadence® Virtuoso, gpdk 180nm technology library.

THEORY:

An **PMOS (p-channel metal-oxide-semiconductor)** transistor is a type of MOSFET where electrons are the majority carriers. It operates in three main regions:

- Cutoff Region
- Linear Region
- Saturation Region

1. Cut-off Region:

- Condition: $V_{SG} < V_{TP}$
- Drain Current:

$$I_D = 0$$

- In the cut-off region, the PMOS transistor is off, and the drain current is zero.

2. Linear (Triode) Mode:

- Condition: $V_{SG} > V_{TP}$ and $V_{SD} < V_{SG} - V_{TP}$
- Drain Current Equation:

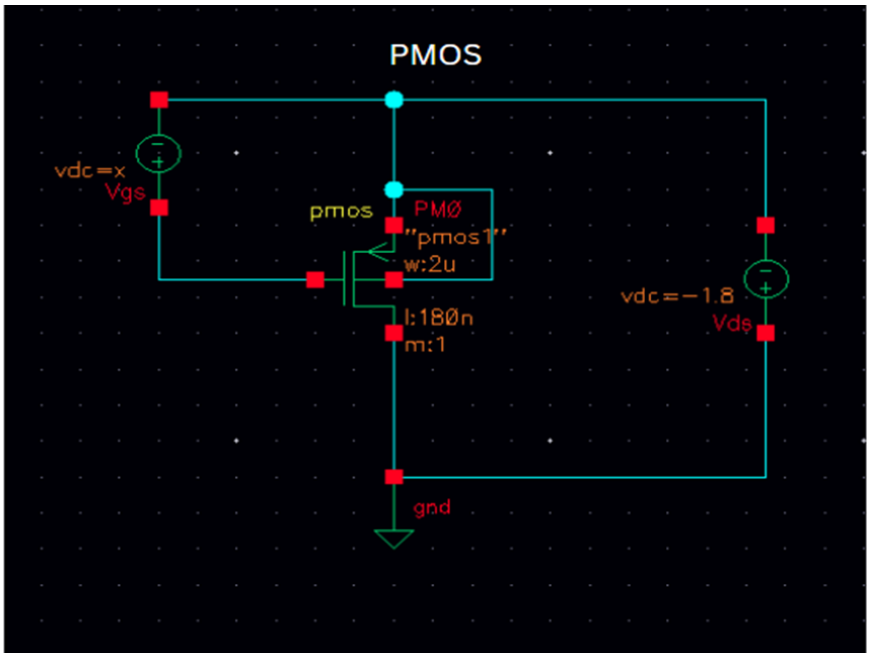
$$I_D = \mu C_{ox} \frac{W}{L} [(V_{SG} - V_{TP} - V_{SD}/2)V_{SD}]$$

3. Saturation Mode:

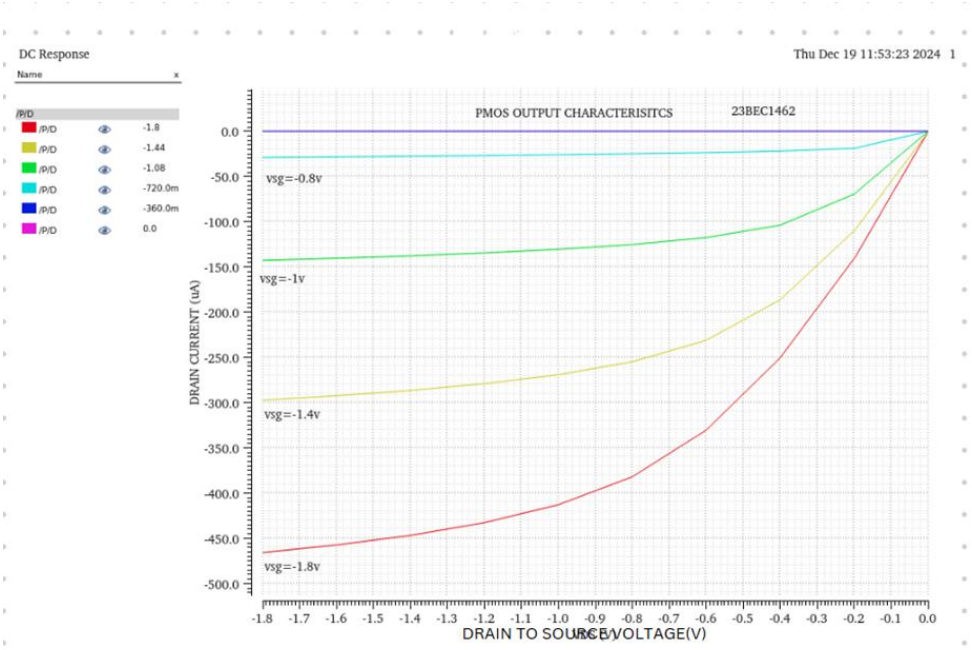
- **Condition:** $V_{SG} > V_{TP}$ and $V_{SD} \geq V_{SG} - V_{TP}$
- **Drain Current Equation:**

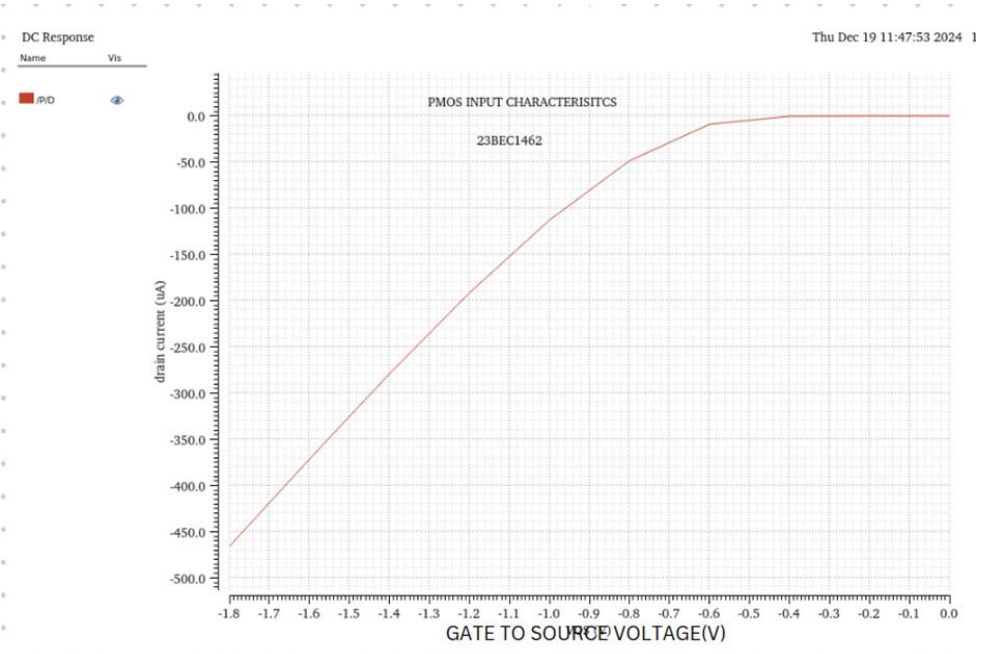
$$I_D = \frac{1}{2}\mu C_{ox}\frac{W}{L}(V_{SG} - V_{TP})^2$$

CIRCUIT SCHEMATIC:



SIMULATION WAVEFORMS:





INFERENCE:

From the Output characteristics of PMOS you can observe that the things which is already discussed early in the theory section. From the input characteristics of PMOS, we can clearly That is, the source-to-gate voltage must be greater than the magnitude of Threshold voltage, once it crosses the Threshold voltage then the drain current increases exponentially.