5 - 60\Omega \cdot I_E - 0.65V - I_E \cdot 6\Omega = 0

\[ I_E = I_{E1} - I_{E2} \]

5 - 60\\Omega \cdot I_E - 0.65V = 100 \cdot I_E \cdot 4.3\Omega + I_{E2} \cdot 5.7\\Omega = 0

\[ V_{AC1} - V_{AC2} = 5 - 0.65 - 0.65 \]

\[ -60\\Omega \cdot I_E - 8.6\\Omega \cdot \frac{\beta}{300} \cdot I_{E2} = 0 \]

\[ I_{E2} = I_{E1} \]

\[ 4.35V = 1350 \Omega \cdot I_{E1} + 4.3\\Omega \cdot I_{E2} = 0 \]

\[ 9.7V - 60\\Omega \cdot I_{E1} - 1080 \cdot I_{E2} = 0 \]

\[ \begin{bmatrix} 4.35V \\ 9.7V \end{bmatrix} = \begin{bmatrix} 1350 \Omega & -4.3\\Omega \\ 60\\Omega & +1080 \end{bmatrix} \begin{bmatrix} I_{E1} \\ I_{E2} \end{bmatrix} \]

\[ I_{E1} = 3.23 \mu A \]

\[ I_{E2} = 7.23 \mu A \]
\[ V_{c1} = 5 - 60 \times 10^{-3} \times 2 - 0.65 = 4.16 \]
\[ V_{ce1} = 10 - 6.16 = 5.84 \text{ V} \]
\[ V_{c2} = V_{c1} - 0.65 = 7.5 \text{ V} \]
\[ V_{ce2} = 0.07 \text{ V} \]
\[ I_{c1} = \beta \times I_{c1} = 0.87 mA \]
\[ I_{c2} = \beta \times I_{c2} = 0.87 mA \]
1.0 Introduction

Metal-oxide-semiconductor field-effect transistors (MOSFETs) are widely used in modern electronic circuits due to their high-speed performance and low power consumption. They are characterized by a high input impedance and are used in a variety of applications, including digital and analog signal processing.

The saturation condition occurs when the drain current reaches its maximum value, typically at high values of drain voltage. This condition is crucial for understanding the behavior of MOSFETs in various circuits.

For the given circuit, the saturation condition is achieved when the drain current reaches its maximum value. This can be calculated using the saturation formula:

\[ I_D = \frac{1}{2} \mu C_W V_D^2 \]

where \( I_D \) is the drain current, \( \mu \) is the mobility of the charge carriers, \( C_W \) is the capacitance per unit area, and \( V_D \) is the drain voltage.

In the given circuit, the drain voltage is \( V_{DS} \), and the saturation condition is reached when the drain current is equal to its maximum value. This condition can be expressed as:

\[ V_{DS} = \frac{2.1 \times 10^{-3}}{126.13 \times 10^{-6}} = (V_{DS} - V_T)^2 \]

Solving for \( V_{DS} \), we get:

\[ V_{DS} = 2.86 \text{ V} \]

Therefore, the saturation condition is achieved at a drain voltage of 2.86 V.
\[ V_{GS1} = 2.6 - 5kV, \ O.C. = 1.45\ V \]

\[ V_0 = 0 \quad V_{GS1} = V_0 - V_{S1} \Rightarrow V_{S1} = -1.45\ V \]

\[ V_{DS1} = 2.5 - I_{D1}.1k\Omega = 2.28\ V \]

\[ V_{DS} > V_{GS} - U_T \]

\[ V_{DS1} = 3.74\ V \]

\[ V_{D1} = V_{G2} \]

\[ V_{G52} = 2.86\ V \Rightarrow V_{S2} = -0.65\ V \]

\[ V_{D2} = 2.6V - 100\ V, 2\ W = 2.3\ V \]

\[ V_{DS2} = 2.3 + 0.65 = 2.95\ V \]