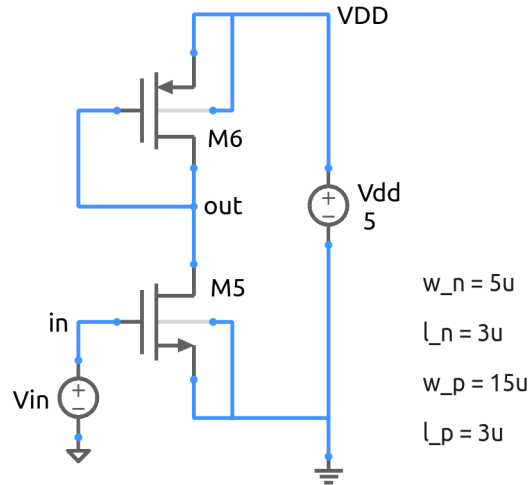


mos_vco_1b.sqproj



The circuit shown in the figure is used to control the current drive in a voltage-controlled oscillator (VCO) and thereby the oscillation frequency of a ring oscillator. The complete VCO circuit can be found in `mos_vco_1.sqproj`.

As V_i increases, $I_{M6} = I_{M5}$ increases, and the increase in I_{M6} is accompanied by an increase in $V_{SG}^{M6} = V_{SD}^{M6}$, i.e., a decrease in V_o . The circuit is designed so that V_o varies over a wide range of V_i . This should be contrasted with an inverter in which the fall in V_o with increasing V_i is designed to be as sharp as possible in order to get good noise margins.

Exercise Set

1. Simulate the circuit, and plot V_o versus V_i .
2. Make the following changes and compare the V_o - V_i plot with the original plot.
(i) $w_n = 3\mu\text{m}$, (ii) $w_n = 10\mu\text{m}$, (iii) $w_p = 5\mu\text{m}$, (iv) $w_p = 25\mu\text{m}$.

References

1. R. J. Baker, H. W. Li, and D. E. Boyce, *CMOS Circuit Design, Layout, and Simulation*, Prentice-Hall India, 1998.